SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

THE IRON AND STEEL INSTITUTE.

The advantage of the free interchange of opinion among practical men was especially apparent at the meeting of the Iron and Steel Institute, referred to in the Supplement to last week's *Mining Journal*, for, although each speaker was naturally biassed in favour of the system to which he has been accustomed, the observations made with regard to other systems afforded the best possible opportunity to impartial hearers to judge of the relative merits of each. To hear the opinions of such men as MENELAUS, FOTHERGILL, COCHRANE, ISAAC LOWTHIAN BELL, WILLIAMS, and Sir JOHN ALLEYNE upon details connected with iron-making is an adequate return for the cost of securing membership of the Iron and Steel Institute, and of attending the meetings, whatever part of the kingdom they may be held in. Even the most complete published report fails to render the views entertained upon the several points so clear as they are when elucidated by reference to the diagrams exhibited in illustration of the arrangements, so that the executive of a society need have no fear that the utmost publicity being given to their proceedings will lessen the number of their members.

ON ROLLING RAILS.

The discussion of Mr. MENELAUS' paper, "On Improved Machinery for Rolling Rails," elicited a vast amount of information. It seems that the object sought to be achieved in rail-rolling is to avoid stopping the rolls after each passage of the rail under treatment. It is not difficult to comprehend that with machinery running at only 40 revolutions per minute the loss of time and power resulting from reversal every time that 15 ft. of iron has been passed through is considerable; and, if nothing else were learnt at the meeting of the Iron and Steel Institute, all must have been convinced that the opinion, which had still been entertained by some that there was no loss of economy from reversing, was erroneous. Perhaps, the most remarkable statement made in this connection was that of Mr. C. W. SIEMENS, F.R.S., who actually suggested that an advantage was obtained by stopping the engine as well as the rolls. For very heavy work such a system may, indeed, be admissible under some exceptional circumstances, but, as it was objected, if it be unadvisable to stop the rolls, how much more so it must be to stop the whole of the machinery, even apart from the fact that by adopting Mr. SIEMENS'S suggestion it is practically impossible to work two sets of rolls from one engine, which is frequently done at present. The loss of the accumulated power at each reversal becomes of itself an important item in connection with the cost of rail-rolling, and hence the efforts of practical rail-makers to keep their rolls continually going in one direction.

Assuming, then, that the desirability of avoiding the reversal of the rolls is admitted, the question naturally arises, How can that object be most easily and economically accomplished? The pile of iron, it must be remembered, is in a heated state, and has to be passed a certain number of times through the rolls whilst still soft enough to take the impression of them. The use of hot rolls to prevent the abstraction of heat will scarcely be suggested, seeing that it is not required to effect the union of the rolls and the rails, although some of the suggestions appear but little more worthy of adoption. In devising a plan of operation there are necessarily many circumstances to be considered; yet, if simplicity can be combined with efficiency, the result should be a machine that would be generally adopted. The system of roll before roll has been suggested, and, where large quantities of metal have to be rolled without change of section, may possess some advantage, but it seems to necessitate an enormously large plant for the performance of a given quantity of work; it has another objection, to which reference will be made presently. The mode proposed by Mr. MENELAUS for overcoming the difficulty consists in placing two pairs of rolls, one a little behind and higher than the other. In using this arrangement the rail is passed backward and forward, but the rails are never stopped. The rail is passed through the bottom pair, then lifted and returned through the other. It will be seen that Mr. MENELAUS has the advantage of two distinct pairs of rolls, very conveniently placed with regard to each other. The lifting of the end of the rail is, no doubt, an inconvenience, but it is a very small one—so small, indeed, as scarcely to be worthy of consideration. In another arrangement, proposed by Mr. BROWN, this lifting is avoided, but it seems that the remedy is almost worse than the disease. He has two pairs of rolls, one behind the other at the same level, each pair having blanks and working grooves alternately, the blanks in one pair being opposite the working grooves of the other. The rail to be rolled is passed through a pair of blanks in the first pair and rolled in working grooves in the back pair, and is then returned through blanks in the back pair and rolled in the front pair. The rail, instead of being lifted after each passage, is moved horizontally, and some of the practical men present seemed to consider the removal of the hot rail horizontally more objectionable, because more liable to twist it out of shape, than the lifting of it.

But that which promises to militate most against the introduction of Mr. BROWN'S arrangement is its extreme costliness. The stock of rolls has to be doubled for a given number of working grooves, and one-half of the roll surfaces become mere rollers, which do no useful work whatever. And as to changing two pairs of rolls instead of one each time a fresh section has to be rolled, there is the same objection in the roll before roll system, in that of Mr. MENELAUS, and in Mr. BROWN'S; hence the question raise by some—What is the advantage of reversing? Yet it was admitted the advantages of avoiding the reversal of the rolls far exceeded any supposed disadvantage, and that it was merely a question as to the best means of doing it. Roll before roll, the Dowlais rolls, and Mr. BROWN'S rolls all having objectional features, and the reversal of the rolls (no matter what means of reversing may be adopted) being more objectionable than either, the Ramsbottom rolls naturally claim attention. Mr. RAMSBOTTOM has all the advantages claimed for the Dowlais rolls, and uses only a pair and a half instead of two pairs of rolls, and thus secures apparently the utmost attainable economy. The three rolls used by Mr. RAMSBOTTOM run in one pair of standards, and being all geared together the middle roll runs in the opposite direction to those above and below it; the rail can, consequently, be passed through between the bottom and middle rolls, and returned between the middle and top rolls, the whole of the machinery running in the same direction all the time. As in the other system of to and fro rolling without reversing the rolls, the end of the rail has to be lifted after each rolling, but in practice this really seems to be a very small inconvenience, so that, upon the whole, Mr. MENELAUS' observation, that if he had another mill to put up at Dowlais he did not know that he would not adopt Mr. RAMSBOTTOM'S plan even instead of his own, is one which is worthy of the utmost consideration of all who are practically engaged in the rolling of rails.

GAS FURNACES.

From the great movement in favour of using fuel in its gaseous instead of its solid form, the discussion of Mr. BENSON'S paper "On the Generation of Combustible Gases under Pressure" was looked forward to with much interest. With regard to the quantity of fuel used to produce a given quantity of heat, it is, probably, admitted generally that the use of it in the gaseous state is not so economic, but against this there are advantages which far more than balance any want of economy. Mr. BENSON'S object was to describe an improvement upon Mr. SIEMENS' furnace, which he had devised; and although Mr. SIEMENS regarded Mr. BENSON'S furnace as somewhat complicated, it has, probably, some advantages, which will secure its extensive adoption. The advantage of putting the fuel into gas before using it is that it can be more readily purified, and that a much higher temperature can be obtained without draughts. When Mr. BENSON commenced experimenting he found that a high pressure could not be used; the pressure in the generator he now described was only enough for the pressure in the furnace. The advantage of his arrangement was that you could obtain all the results sought, and could use caking as well as non-caking coal.

HOT-BLAST STOVES.

In discussing Mr. WHITWELL'S paper, "On a Fire-Brick Hot-Blast Stove," the question appeared to turn chiefly upon the relative merits of metal and fire-brick. Mr. ISAAC LOWTHIAN BELL laboured hard to prove that fire-brick possessed no advantage as compared with iron, but he succeeded very partially, although his theory was most interesting. Mr. BELL treated the matter as dividing itself into two distinct and natural heads—the use of the fire-brick stove as a means of raising the temperature of the air, and the question of its being able to supply the smelter with a temperature quite beyond the reach of cast-iron stoves. These are two of the heads, no doubt, but not the only two. Perhaps the more important question is whether a given temperature can be maintained more regularly and economically by the use of the fire-brick stove than of the cast-iron stove, and the discussion appears to have determined this in favour of the fire-brick stove. In the course of his observations, Mr. BELL gave currency to two important hypotheses—that the maximum of useful temperature for hot-blast is below 1400° Fahr., and that the carbonic oxide formed in the combustion of fuel will only reduce iron ore until a point of saturation (which he alleges to exist) is reached, and that then the carbonic acid begins to re-combine with the reduced iron, re-forming carbonic oxide and a factitious iron ore. The theories are rather wild, it is true, but when they are promulgated by so eminent an authority as Mr. BELL they certainly demand attention. Placing results against theory, the advantage appears to be entirely on the side of the fire-brick stoves. It is by means easy to agree with Mr. BELL that there is no difficulty in comparing the Whitwell stoves with the Clarence stoves, nor can it be admitted that Mr. BELL has made any rational comparison whatever. He estimates, and estimates only, that with the Clarence stoves they will make 100,000 tons of iron, and states that the cost of those stoves was 1500*l.*, which, distributed over 100,000 tons, gives 3·6d. per ton. Now, obviously the mode of comparing the fire-brick stoves with these would be to estimate the number of tons that can be made with the fire-brick stoves, and as he states that fire-brick stoves to supply blast at the same temperature (1000° Fahr.) would cost 2250*l.*, he should divide 2250*l.* by that number. If he estimate that 150,000 could be made with the fire-brick stove the results would correspond—that is to say, the figures would be 3·6d. per ton in each case. But it would probably be a fairer estimate to take 200,000 tons for the fire-brick, and this would show a result that would place the Clarence stoves entirely in the background.

Suppose, however, it be taken that 3·6d. for the Clarence and 3·6d. for the Whitwell stoves are the exact figures, Mr. BELL admitted an advantage for the fire-brick stove, which in the discussion of the hypothetical statements was almost lost sight of; he stated that although, fortunately, their cast-iron stoves at the Clarence Works had been run five years without accident, there was nothing to guarantee, owing to their liability to become overheated through trifling carelessness on the part of the attendant, that within five minutes of when he was speaking they would not be totally destroyed. Mr. BELL admitted that this was a great recommendation in favour of the fire-brick stoves, yet neither the advocates nor the opponents of them gave this important admission any prominence. There is no probability of the fire-brick stove being destroyed, or even damaged, by excess of heat, so that unless there be some great economy to compensate for the increased risk in using cast iron, fire-brick would appear to be quite entitled to the preference. Amongst the other advantages, which Mr. BELL acknowledged the fire-brick stoves to possess, was that there was an enormous difference of friction, and that they possessed the power of robbing the escaping gases of a far greater amount of heat than they could ordinary effect in cast-iron stoves. The temperature of the escaping gases appears from Mr. BELL'S experiments to be as 1200° or 1400° Fahr. to 400° Fahr., the difference being in favour of the Whitwell stoves. As to Mr. WILLIAMS' assertion that at their works they intended to introduce a system of valves which will prevent the cast-iron stoves being destroyed, however they may be neglected, it need only be said that the more the cast-iron stove is complicated by the introduction of valves, and other contrivances intended to protect it from the injury to which it is liable, the more difficult it will be to compare it in point of economy with the fire-brick stove.

Whether Mr. BELL'S theory as to the re-formation of iron ore and carbonic oxide in the furnace be justified or not, it is certain that men of equal practical experience are much divided in opinion as to the value of increasing the temperature of the blast above 1000° Fahr. Thus Mr. WILLIAMS opines that if the capacity be increased beyond 11,000 or 12,000 ft. there is no further diminution in the quantity of fuel required for each ton of iron, and he considers that the same observation applies with regard to a temperature above 1000° Fahr., whilst Mr. COCHRANE denies both. In a furnace of 20,000 ft. capacity, and using a temperature of 1422° Fahr., he was able distinctly to trace 4 cwts. of fuel economy to increased capacity, and from 4 to 5 cwts. to increased temperature, plainly showing that although it cannot be supposed that there is no limit, the maximum does not yet seem to have been reached.

IRON AS A SHIPBUILDING MATERIAL.

The object of the paper by Mr. C. M. PALMER was to trace the influence of iron as a material for shipbuilding upon the commerce and armament of nations. He considered, firstly, the advantages of iron as a material for building ships, and, secondly, the gradual development of the use of that metal in the construction of vessels, and its influence on commerce and armaments. It is estimated that if the skin of a vessel could be made 6 in. thick without joints it would be equal to iron plating rivetted together of 1¼ in. in thickness. This proportion is established on a comparison of the tensile strength of the two materials, but so far greater are the facilities for uniting different pieces of iron to those of combining wood that the 1¼-inch plating would be 134 times stronger than the wood sheathing, combined in the ordinary manner used in wood shipbuilding. Iron being so far superior to wood it must, in the opinion of Mr. PALMER, be considered the best material for shipbuilding until the manufacture of steel is perfected, and that article produced at a cheap rate. In the meantime steel can only be used with advantage in exceptional cases, and he thought it was for the members of the Institute to so perfect the manufacture of steel that whilst the price shall be comparatively low the quality shall be uniform. Then the extra strength will, doubtless, cause it to be generally adopted, both in vessels for the merchant service and in ships of war.

The principal question raised with regard to the paper was whether any really efficient means of preventing fouling could be devised. It seems that in every respect except fouling iron has decidedly an advantage over wood, and it was the opinion of practical iron shipbuilders that if fouling could be prevented the increase in iron shipbuilding would be enormous. Iron has been used for inland navigation in positions where wood would be quite inapplicable. The remedies which have been proposed have been very numerous, but not one seems to have been thoroughly effective, the docking and cleaning of iron vessels being apparently an inevitable necessity. The coppering of iron vessels is looked upon as one of the most reliable preventives, but even this is at best but a makeshift. It is costly and inconvenient to apply, and liable to injury through trifling accidents when it is applied. A great advantage is claimed for iron as a shipbuilding material, on the ground that a vessel can be given finer lines and greater length, the natural result being an increase of speed. The lines of a wooden vessel will, of course, bear no comparison with those of an iron one; but, with regard to the continual increase in length, it is doubtful whether many of the calamities which have occurred to iron ships have not been caused through their too great length, and the great inclination of iron shipbuilders to sacrifice safety to speed, although by doing so they damage the reputation of metal ships as a class, and thus permanently injure the trade which it is to their interest to foster.

THE BRIDGEWATER COLLIERIES.

The valuable estates and mineral property, in the Worsley, Hulton, Bolton, West Houghton, Hindley, and Wigan districts, now belong to the Earl of Ellesmere, as successor to the last Duke of Bridgewater. The mineral property in these districts is very extensive; a considerable portion of it is leased to other colliery proprietors. There are 25 different plants where coal is raised at the Bridgewater Collieries proper. Under the direction of Mr. Fereday Smith great extensions have been made in the productive powers of these collieries during the last six years, including the sinkings at Moseley Common, Ashton Field, Ellesmere, and Bridgewater, and the machinery in connection with them. New railways have been made, others are still in progress to meet the requirements of these large establishments, these branch lines joining the Manchester, Eccles, Tyldesley, and Wigan Railway at Worsley, and at Ellenbrook, Walkden, and Middle Hulton. The intention is to bring the whole mineral property of the Worsley and Hulton districts into connection by rail, not only with the Bridgewater Canal, but with the London and North-Western system, and with advantageous points on the turnpike road to Manchester.

One notable feature in the works of these collieries is the navigable tunnel and branches from it in connection with the canal, constructed at the expense of the last Duke of Bridgewater, about a century ago. The Bridgewater Canal extends from Runcorn to Worsley, a distance of 28 miles; it is constructed without any locks. There is also a branch of 4 miles in length to Manchester, and another branch of 6 miles to Leigh. From Worsley the canal is extended underground by a tunnel driven across the coal measures in a north direction, up to the Dixon Green Pits. This tunnel is 4 miles in length, and where the coal mines are intersected navigable levels are driven in the different seams; the length of these levels is 41 miles, part of which are now disused, making a total length of 45 miles of navigable passages. The ordinary width of the tunneling is 10 ft.; at passing places it is more. About 300 boats carrying 10 tons, and 40 boats carrying 7 tons, are used for the conveyance of coal from the subsidiary levels and tunnel to its entrance at Worsley, from whence the coal is sent to several stations by these boats, or it may be transferred into larger ones: 80 boat loads per day and upwards are brought out from the tunnel. This underground tunneling serves not only for the conveyance of coal in an inexpensive way, but also the purpose of draining a large area of property. Several of the Bridgewater pits are sunk adjacent to and below the level of the tunnel and its branch levels; the coal is then raised from the bottom of the pits to the level of the tunnel, and is there tipped into boats. In some cases there is the option of raising coal up to the surface and sending it away by rail, or raising it up to the level of the tunnel only to be conveyed away by boats.

The Bridgewater collieries are conducted with an evident view to safety in all the operations. The mines do not produce fire-damp largely; in most of them, however, locked safety-lamps are used. Powder is used in many of the mines, but the time will, no doubt, come when this can be dispensed with, as has already been done at some collieries near Wigan, enabling the works to be carried on with safety. The cages are all provided with Owen's safety-catches; great faith and reliance are placed on their acting, in case of any fracture of the ropes; attention is given to keep the springs of sufficient strength: the only case where they fail to act is when the rope breaks

between the engine and pulley, there would then be more or less of tail rope hanging over the pulley, preventing the springs and catches from coming quickly into operation. The quantity of water flowing into these mines is not large, in consequence the pumping-engines are not numerous nor powerful. The underground canals serve as adit levels, and intercept to a great extent the water which would otherwise descend to the deeper workings. The principal engines for raising coal are models of their kind, designed especially with a view to raising large quantities of coal, and to do their work with safety: they are double vertical cylinders, furnished with flat wire-rope drums, powerful steam-breaks, steam-gauges, &c. Steam-capstans are provided, erected in some cases in the same house, for any emergency or repairs.

The mineral working is confined to coal. Ironstone of good quality is found, but not in sufficient quantity to pay for working it. Fire-clay is not worked, though some good beds of it are said to exist.

Particulars of the principal winding-engines and plant at the Bridgewater Collieries:—

BRIDGEWATER COLLIERY.—There are two pits, 12 feet diameter, 45 yards apart. The east pit is sunk 400 yards to the Doe Mine, which is now being opened out; it is intended to be sunk 80 yards lower, to get the Trencherbone seam.

SECTION OF THE DOE MINE.

Top coal	3 ft.	6 in.
Clod band, from	0	6 to 16 in.
Bottom coal	3	0
Total coal	6	6

This coal is of the best quality for house firing. The sinking engine-15-horse power, is used at present to raise coal. The west pit is in course of sinking to the Doe Mine. Its present depth is 300 yards. The water in the pit is drawn with tubs. The winding-engine is placed between the pits. It is now used for sinking. It has two 30-in. vertical cylinders, 5-ft. stroke, direct-acting, non-condensing, with four flat wire-rope drums, 9 ft. in diameter. These are fixed so as to wind with two bands to each pit. But the house is built to receive two engines, and another is intended to be erected for the east pit. The steam-break consists of a 12-in. cylinder; steam of 40 lbs. pressure acting on both sides of the piston; connection with the strap by a long lever. The break-wheel is 12 ft. in diameter; the strap goes half around. There are three Lancashire boilers connected with this engine. The capstan is placed in the same house; 9-in. vertical cylinder, on second motion, with 4-feet drum, and round wire-rope.

MOSELEY COMMON.—There are two pits, 12 ft. in diameter, 35 yards distant, and 333 yards in depth to the Seven Feet or Rams Mine. One at present is the downcast and pump shaft; the other is upcast, and where coal is raised. An air-pit is now being sunk near these, by which means both will be downcasts. The winding-engine is placed between the two pits: it has two 32-in. vertical cylinders, 4 ft. 9 in. stroke, fitted with cog-wheels to work two shafts on second motion; the pinion is 7 ft. and the spur-wheels 8 ft. in diameter. It was intended to work with four flat wire-rope drums—two in one pit to the Rams Mine, two in the other to the Crumbouke, 283 yards in depth; either pair may be disconnected. At present only two ropes are used to the Rams Mine. The cages carry two tubs on one deck; they are intended each to raise four tubs in two decks. From the Crumbouke a tunnel is driven northward to the rise to intersect the Brassy and Rams Mines. One of these pits will, probably, be sunk to the lower mines, in connection with another pit on the crop; the depth will be about 600 yards. A Cornish pumping-engine at Moseley Common goes five strokes, and raises 250 gallons per minute, day and night. It raises water in four lifts from the depth of 245 yards. These are bucket and plunger lifts alternately, the two lower 10 in., the two upper lifts 14 in. diameter. A 12-horse capstan and winding-engine is placed in another house, which also feeds the boilers. There are six plain boilers, with safely-valves, float, and steam-gauge to each. Steam pressure, 37 lbs.

ELLESMERE.—There are two 12-ft. pits, 35 yards apart, 300 yards in depth to the Five-quarter seam; they are bricked from top to bottom. A temporary furnace is in action near the east pit. From the bottom of the west pit a tunnel is driven 300 yards to the north, into the Trencherbone seam, which is being opened out. A pair of air-ways are driven to the rise 100 yards; these will be extended to an air-pit, now in course of sinking, specially for ventilation.

SECTION OF THE TRENCHERBONE SEAM.

Good roof.

1.—Top coal	1 ft.	6 in.
2.—Fire-clay	2	0
3.—Good coal	5	0=6 ft. 6 in.
4.—Underclay.		

The Five-quarter seam is 3 ft. of inferior coal, and a band of 8 in. near the top of it. The fire-clay underneath is of good quality. The winding-engine is placed between the pits; it has two 32-in. vertical cylinders, 4 ft. 9 in. stroke, direct acting, with two flat wire-rope drums, but four can be applied, so as to wind with two bands in each pit. The steam-break and capstan-engine are the same as those described for Bridgewater—three Lancashire boilers for this engine. The Ellesmere and Bridgewater winding and capstan engines were all built by J. Nasmyth, of Patricroft. The Ellesmere pits are sunk about 20 yards distant from the navigable tunnel. Coal is raised from the bottom of the pit to the level of the tunnel, or 67 yards below the surface. The head gear at the top of Ellesmere Pit is 64 ft. in height from foundation to the centre of pulleys. Pulleys 14 ft. in diameter.

ASHTON FIELD.—No. 2 Pit: Depth, 200 yards to the Trencherbone seam. The large winding-engine has two 32-in. vertical cylinders, 4 ft. 9 in. stroke, direct acting, plain drum, 16 ft. in diameter, for round wire-ropes; galvanised ropes are used, 12-in. cylinder for steam-break, 16-ft. break wheel, the strap goes half round. Engine built by J. Musgrave and Sons, Bolton. This engine, as well as one of 26-horse power at No. 1 pit, raise coal from the bottom of each pit to the level of the navigable tunnel, near which they are situated. Water is raised with tanks by the large engine at nights. Cannel is found 70 yards below the Trencherbone, and is worked here, its thickness is 2 ft. 6 in., and quality good. The Arley Mine is as yet unproved in this district; its probable depth will be 210 yards below the Cannel.

LINNYSHAW.—There are two pits, about 30 yards apart, one downcast, one upcast, sunk to the Rams Mine. About 40 yards of metal tubbing is inserted in each pit; this is cased with fire-brick inside, to protect it from the action of the water, which is very corrosive, and the variation in temperature of the upcast shaft. The winding-engine is placed between the pits; it has one 30-in. vertical cylinder, 5-ft. stroke, direct acting, four flat wire-rope drums; two of these are in use—one to Rams Mine, one to Crumbouke, 50 yards higher. The steam break has a 12-in. cylinder, 8-ft. break-wheel, and strap half around. The capstan-engine is 8-horse power. A bull pumping-engine, of 70-horse power, is erected over one of these pits. A pumping-engine, of the same power and construction, is in operation at Edgefold Colliery.

COPPICE FIELD COLLIERY.—There are three pits sunk here, all downcasts. No. 1 pit is 7 feet in diameter, 210 yards to the Rams Mine; No. 2 is 8 feet in diameter, 10 yards apart from No. 1; No. 3 is 7 feet in diameter, 180 yards in depth, and 100 yards apart from No. 2. The Cinderfield Pit is the upcast for the whole of the mines, and is 200 yards to the rise of No. 3 pit. The winding-engine is placed between No. 2 and No. 3 pits; it has one 32-in. vertical cylinder, 5-ft. stroke. This engine lately worked with three cog-wheels, all of equal diameter, and four flat-rope drums—one rope to No. 1 pit, for one-deck cage, holding two tubs; two ropes to No. 2 pit, a single cage to each; one rope to No. 3 pit, for single-deck cage, holding two tubs. This arrangement is altered; No. 3 pit is stopped; the engine works with two shafts and two cog-wheels only, and two wire-rope drums, of 11 ft. diameter; one rope to No. 1 pit, for a two-deck cage, holding four tubs, and another rope to No. 2 pit for a similar cage. Three boilers are used, with a working pressure of 40 lbs.; steam-break has an 18-in. cylinder; 6-ft. break-wheel; the strap goes all around, the friction being increased by a long lever. The pumping-engine is a 28-in. cylinder, beam construction, 5½-ft. stroke, condensing: it works on second motion. Motion is communicated to the pump-rod by a horizontal rod and T-bob; water is raised by two 6-in. bucket-lifts, 105 yards each, one delivering at the surface. The steam from the winding-engine escapes into a balloon boiler, and is used from this at a pressure of 2 lbs. to supply the pumping-engine. The engine pumps about one day in the week. A capstan engine is erected in the same house, which is also used to feed the boilers. Near the bottom of the Coppice Field No. 2 Pit a tunnel, 300 yards in length, is driven southward from the Rams to the Bin seam, intersecting also the Brassy and Crumbouke seams. The dip of the measures is 1 in 4 to the south. All these seams are worked; about 300 tons of coal per day is raised from the whole.

SECTION OF THE RAMS MINE, AT THE EAST SIDE OF THE PITS.

1.—Roof, or top coal..	2 ft.	6 in.	Left for a roof.
2.—Good coal	3	6	
3.—Foot coals	1	6	Engine coal, hole in this.
Total	7	6	

The levels, one main and one counter level, were driven about 300 yards to the boundary, and are being worked back. Jig brows are driven up to the rise, 60 yards apart; these are holed into each other every 60 yards. Out of these jig brows the working levels are driven in ranks, about 15 yards apart. All the levels and jigs are 5 ft. wide. There are three jigs now going, the furthest 45 yards in length, the second 60 yards, and the third 80 yards. At the top of the 45 yard jig three bays are at work to the east, one a little in advance of the other. The bays are driven from 8 to 10 yards wide, first under the Top coal, which is afterwards got in working the bays downward. A pillar of coal is left at the commencement of each bay, and a pillar of 3 or 4 ft. is left above that, between each, which serve to ventilate these places. Three bays are at work in the next rank above, the coal from which is taken to the 60-yard jig; and other three are at work in the next rank, and go to the 80-yd. jig. The whole range is 100 yds. up to the old work. The sheave for each jig is horizontal, 3 ft. in diam., wire-rope 2¼ laps around it; double roads on the inclines. The tubs in each bay are raised and lowered by a "spunny," the chain merely working round a prop. The jigs are shortened successively as the levels are worked back. The levels on the west of the pits, in the Rams Mine, are driven about 1400 yards to the boundary, all 5 feet wide, and are commenced to be worked back. The Brassy seam is 2 ft. 9 in. in thickness; the east levels are being worked back; the west levels are driven about 1100 yards, and are still being extended. The main level is 5 yards wide; the counter level, 10 yards above, is narrow; the jig brows, 60 yards apart, are also strait; and the level ranks from 20 to 30 yards. The bays are from 10 to 12 yards wide. The Crumbouke seam is 3 ft. in thickness; there is 12 in. of bass underneath, then fire-clay; the holing is made in the bottom of the coal. The main level only is driven 5 yards wide; the other levels and jig brows are made strait. The east levels are being worked back. The west levels have reached the boundary, and the preliminary jig brows and levels in ranks are being driven. The ranks are from 30 to 40 yards apart. The bays are from 12 to 18 yards wide. The west levels in the Bin seam are standing at the boundary. The jig brows are being driven up, preparatory to working back. The ranks are made from 20 to 30 yards apart in this seam.

SECTION OF THE BIN SEAM.

1.—Top coal	0 ft.	10 in.	
2.—Clod	1	0	Used for packing.
3.—Good coal	2	8	Hole in bottom of this.
4.—Underclay.			

The range to the old works is much greater in this seam than in the Rams Mine by the length of the tunnel. Davy lamps are used in all these workings at Coppicefield; powder is used in the strait work, but little in the bays. Eight horses are employed in these mines; wood tubs, running on bridge-rails 18½ in. gauge, carry 6 cwts. of coal. The Cinderfield Pit is the upcast for the whole: it is 120 yards deep. A tunnel is driven from the bottom of it, into which the air from the different seams unites; 40,000 cubic feet of air per minute circulates through the workings; the furnace is 6 ft. wide, and 7 ft. long, and is supplied with fresh air, about 6000 ft. per minute.

The custom of the Bridgewater trustees, in all the pits, is not to commence getting wide work until the levels are driven to the extreme boundary of the area intended to be got by each respective pit. By this means better ventilation is secured, as well as greater safety to the mine. An improved method of driving levels is, however, in contemplation, whereby the coal that is got out of them is likely to be less damaged by the driving. The Bridgewater trustees are greatly improving their general methods of working, so as to adapt them to the more rapid means of transit, which the recent introduction of the London and North-Western Railway into the estate is enabling them to bring about. We understand that there is sufficient coal under the estate, to the depth of 600 yards, to last upwards of 1000 years, at the present average rate of working per annum, in addition to which a large quantity probably exists below that depth.

THE ASTLEY AND TYLDESLEY COLLIERIES.

The Astley and Tyldesley Coal and Salt Company have upwards of 1000 acres of royalty, in freehold, and under lease from the Bridgewater Trustees, Colonel Ross, and others. Coal is raised to the extent of 300 tons per day at the Tyldesley pits; at the Nook Pit, 1200 yards south of these, 250 tons per day is raised; and at Cross Hillock, about 50 tons per day. The Cross Hillock Pit is 123 yards in depth to the Worsley Four-feet seam. This is now worked; it is the highest workable coal in the Lancashire field. It has been extensively worked in the southern part of the royalty. The pumping-engine at Cross Hillock has two 24-inch horizontal cylinders, on second motion. By means of one horizontal rod and a T-bob at each side of the pump-shaft, it works one 12-inch and one 15-inch lift, 5-feet stroke; both are plungers, and both deliver at the surface. It goes about seven hours per day at present. The winding-engine at this pit has one 15-inch horizontal cylinder, 2½-feet stroke; coal is raised with one rope and one single cage, running on two wire-rope guides. Another pit is being sunk near the coal pit as an upcast, and a 26-inch beam-engine is used for drawing material. The Worsley Four-feet seam has also been worked at Jackson's Pit, where a downcast and upcast were put down; and at Bedford pits, also downcast and upcast. These have finished working for some time. At the old Nook Pit the Worsley Four-feet has been worked more recently. A 26-inch beam-engine for winding, and a 14-inch table-engine for pumping, are still standing; the latter was appropriated for hauling from a downbrow in the Four-feet, after the commencement of the New Pit engines. The coal from all these pits was sent to the Bridgewater Canal at Marsland Green for exportation.

The new Nook Pit was commenced about twelve years; it was suspended several years, owing to a large feeder of water encountered in sinking through the rock, about 200 yards down; the present engines were erected in 1864, with which the pit was successfully sunk. It is 14 feet in diameter, 400 yards in depth to the Crumbouke, walled throughout, without tubbing, and is downcast; the upcast being that at Tyldesley. The rise of the coal measures is nearly north, towards Tyldesley pits, and averages 1 in 6. The royalties extend east from the Nook Pit about 2800 yards, and westward about 2600 yards, to a large fault, the size of which is, probably, 300 yards dip to west. Within these limits, and throughout the whole of Tyldesley workings, only one small fault is found, of 6 in. throw. From the bottom of the Nook Pit a tunnel, of 260 yards length, is driven to the north, from the Crumbouke seam, intersecting the Brassy and Six-feet seams. Both the Crumbouke and Six-feet coals are in course of opening out on the Lancashire system of working, by driving principal levels, in pairs, first to the boundaries, and jig-brows between them, in pairs, at intervals of about 150 yds.; these are all driven narrow, from 6 to 8 feet in width. Between the jig-brows the working levels will be afterwards driven, when the time arrives for working back, these will be in ranks from 30 to 40 yards apart, and will be narrow or wide, as circumstances dictate. The question of safety is first considered in this preliminary driving out; the cost of getting coal is greater at this period than when it is finally worked back in bays, yet the system is supposed to give more safety, by leaving all goaf behind, and which can, in a measure, be ventilated by leaving an air-way around the outside of it. On the other hand, the great length of bratticing required in driving out the levels, and the quantity of strait work, are serious objections to the system, when strait work is necessitated from the nature of the roof. About one-seventh of the coal is got in the preliminary workings, and six-sevenths left as pillars—that is, after the working levels are driven.

LIST OF THE TYLDESLEY SEAMS, AND DEPTH FROM SURFACE.

Worsley, 4 feet	3 ft.	2 in.	115 yards.	
Bin seam	3	0	376	
Crumbouke	3	10	401	Best house coal.
Brassy seam	3	3	416	
Six-feet seam	5	0	446	Best steam coal.

The coals are not proved lower than this: it is computed that the Arley Mine will be 600 yards below the Six-feet, and twelve other seams will be found between them, including the Trencherbone, which has been identified with the Wigan Nine-feet seam. The engines at the Nook Pit were all built at the Haigh Foundry Company's works, erected in 1864, and are of first-class character in design and construction. The winding-engine has two 30-in. horizontal cylinders, 5-ft. stroke, direct-acting, compensating drum, 17 ft. diameter in the middle, 19 ft. at the sides. It is furnished with two breaks; the break rims at the sides are 19 ft. in diameter. The straps go half round; one is a foot break. The other is a powerful steam break, the cylinder is 6 in. in diameter; a lever 10 ft. long, connected with the strap-shaft, is acted upon by steam pressure of 45 lbs. on the piston; steam acts on both sides of the piston. The capstan-engine, in the same house, has two 12-in. horizontal cylinders, 2-ft. stroke, on third motion, the pinion and wheel being first in the proportion of 1 to 7, then as 1 to 6. The drum is 4 feet; the rope is steel-wire, 1¼ inch; 30 tons can be lifted by this motion. The capstan may be changed by the gearing to a quicker motion, in the ratio of 1 to 7. The winding-engine raises two tubs in each cage in two decks, with round wire-ropes; each cage runs on two wire-rope guides. The head gear is 48 ft. high from the foundation to the pulley axles: the pullies are 16 ft. in diameter. The pumping-engine cylinder is 70 in., 13 ft. stroke; it is placed at the side of the pit, and a beam of wrought-iron, 50 ft. long, extends over the pit from the piston-rod, to which the pump-rod is attached, giving a stroke in the pumps of 10 ft. The steam works expansively, and is condensed, the valves being on the Cornish principle. There is a large wrought-iron balance-beam and weights at the top of the pit, assisting in the up-stroke. The engine raises water in two lifts from the depth of 255 yards; this is the feeder of water got in sinking the pit, which does not diminish in any degree. The bottom is a bucket-lift, 15 in., and 135 yards in height; the top is a plunger-lift, 20 in. diameter, 120 yards in height, and delivers at the surface into the condensing cistern. Metallic and gutta-percha buckets have been tried here, but leather ones are preferred. The engine pumps day and night, at the rate of three strokes per minute. There are five Lancashire boilers which supply these engines with steam; the working pressure is 45 lbs. An engine with a pair of vertical cylinders is used to feed the boilers.

The Gin Pit, situated between the Nook and Tyldesley Pits, 14 ft. in diameter, is sunk to the depth of 150 yards, and is now standing where the feeders from the same sandstone referred to in describing the Nook Pit, were got, and in such quantity as to be too much for the engine to lift. No diminution in the flow of water was seen at this pit after pumping operations had been carried on for some time at the Nook Pit. The engine now standing at the Gin Pit has two 24-in. horizontal cylinders, direct-acting, with two Lancashire boilers.

There are two pits at Tyldesley, 30 yards apart, 10 ft. in diameter, walled throughout—one downcast, one upcast. The depth is 240 yards to the Six-feet seam. The winding-engine, placed between the pits, has two 20-in. horizontal cylinders, 4-ft. stroke, direct-acting, one 12-ft. plain drum for round wire-ropes, furnished with one foot-break, break rim 14 ft. in diameter, strap goes half-round. There are four plain boilers, 5 ft. diameter, 50 lbs. steam pressure. Steam from these boilers is taken down the upcast pit to supply the hauling-engines. There is one cage run in each pit on two wire-rope guides; two tubs of 5 cwts. are raised in each cage on one deck. Near the bottom of the upcast a tunnel is driven southward 230 yards long towards the dip to the Crumbouke seam. The Brassy seam is intersected, and about 20 tons of coal per day is brought from one side.

SECTION OF BRASSY SEAM.

Metal roof, bad.

Top coal	1 ft.	6 in.	
Clod	0	9	
Bottom coal	2	4=3 ft. 10 in.	
Fire-clay floor.			

At the south end of the tunnel a downbrow is being driven in the Crumbouke to meet upbrows from the Nook Pit. There is about 1200 yards distance between the pits; about half of this is driven. The downbrow is 40 yards in. The material is brought up by a small engine, placed at the top of it, with a 6-inch vertical cylinder; the engine makes above 200 revolutions per minute, and the drum 38. The engine also raises water by a pump and in tubs. The steam is brought from the upcast in pipes of wrought-iron, 1¼ in. in diameter; the steam escaping is condensed by the water which flows past the engine. The Crumbouke is worked back on the east side of the tunnel; on the west side the working levels have been driven simultaneously with the pair of main levels, they have been driven to the boundary, and are now being worked backwards. The levels are all strait, and the coal is lowered by a series of self-acting inclines from the different working levels or ranks to the main level, or horse-road. There are about 15 ranks altogether here. The first jig is about 400 yards in length, 10 tubs are run each journey; this takes the coal from the level at its top, and two or three ranks above. There is a 3-ft. horizontal sheave at the top, and a wire-rope goes once and a-half round it. Above the top of this jig coal is sent from each rank separately by a "spunny," or short jig, 40 yards long; one tub at once is run each way, by a chain and 12-in. sheave fastened to a prop. The second main jig is about 200 yards long, eight tubs are run with each journey; this takes the coal down from the ranks between the top of it and top of the first jig, the intermediate ranks being worked by "spunnys." The third jig is 80 yards long, two tubs are run each journey; this takes the coal down similarly from two ranks above the top of it. The working stalls or bays are from 7 to 15 yards wide, according to the strength of roof.

SECTION OF THE CRUMBOUKE SEAM.

Metal roof.

Good coal	4 ft.	0 in.
Fire-clay floor.		

The holing is made in the bottom of the coal. Powder and locked lamps are used. A road is made on the fast side of each bay, the tubs are taken up and down by the trammers, being spragged in descending. A pack-wall is built on one side of these roads from the fallen stone, but the stone is large, and unsuitable for this purpose, and timber is required for their support, to maintain a proper size until 40 yards are reached.

The Six-feet seam is worked in the same manner as that described in the Crumbouke. The Six-feet seam averages 5 ft. in thickness, of clean coal, at this pit. The stratum above is loose shale, owing to which 18 in. of coal is left as a roof in the preliminary levels. These levels have been driven in some parts of the district, west of the pits, for six years, and are all standing well and open. The range of workings northward to the boundary is much less here than in the Crumbouke, by the length of the tunnel, and, in consequence, the working back has approached much nearer to the pits in the Six-feet seam than in the other. The bays are made from 6 to 8 yards wide, run about 30 yards in length; use powder and lamps; holing in the bottom of the coal. One side of the road up each bay is supported by timber, both props and chocks; the stone is unsuitable for making pack-walls, and none are built. A down brow is driven about 1000 yards, and levels opened out to some extent. This is now suspended, as the working of the Six-feet seam first is found to do injury to the Crumbouke, above it. The engine for hauling up this downbrow is placed near the upcast, about 40 yards above the main level, and the wagons, after being drawn up the plane, were run back to the pit. The engine has two 16-in. horizontal cylinders, 4-ft. stroke, on second motion; one drum. One or both engines can be used, as required. There are 12 horses at work in both seams; the rails are angle-iron, 17½ in. gauge; these are condemned. The ventilating furnace is 5 ft. wide, 10 ft. length of bars; 80,000 cubic feet of air per minute circulates through the workings of the Nook and Tyldesley Pits, all of which returns to the Tyldesley upcast. The furnace is supplied with fresh air, and a little from one of the short returns. The Tyldesley Pits have been in operation eight years; no explosion has occurred in them; the production of fire-damp is not great. To ensure complete safety nothing is required but watchful attention, and maintaining in every working place proper air-ways. The coal is separated underground as large and mixed; this is afterwards screened at bank. The London and North-Western Company's railway—the Manchester, Eccles, Tyldesley, and Wigan line—passes close to these

pits; it has been opened six years, and has given another outlet for the produce of this colliery by rail, principally to Liverpool and Manchester, as well as the old one by the Duke of Bridgewater's Canal. Two locomotives are employed—one on the 4 ft. 8½ in. gauge, another on a gauge about 2 ft. conveys coal to the canal at Marsland Green.

MINES REGULATION, TRUCK, AND ARRESTMENTS.

SIR,—The request of the miners for more frequent payments, as a relief from truck and arrestments, is so reasonable that I do hope Parliament will see fit to comply with their prayer—indeed, I think the Arrestment Act will be incomplete without it. The following is a fair statement of facts, and the remedy I propose would satisfy the workmen, and, moreover, it is perfectly workable and feasible.

ARRESTMENTS.—If a man fails to pay his debts, from whatever cause, the creditor can *arrest* the wages lying in his master's hands. There are many cases of hardships; but, on an average, the costs add 30 per cent. to the debt.

TRUCK takes two shapes—stores and poundage. 1. Stores: The owner keeps a shop wherein groceries, clothing, and all kinds of goods are kept which the workman requires. The workman gets advances daily on the wages he has earned, but only if he spends the money so advanced in the purchase of goods in the owner's shop; if he does not spend the money so advanced in the shop he will not get more when he next applies for it. If a dull time comes the man who spends money in the store is kept on, and he who does not is dismissed. The profits of the store vary from 12 to 15 per cent., and, as a rule, are not exorbitant. The goods kept are usually of the best quality.—2. Poundage is another form of truck where the master keeps no store, but gives advances of money to account of work done, deducting a shilling off each pound advanced; in some cases the interest is 3d. for any sum under 5s., 6d. for any sum from 5s. to 10s., 9d. for any sum from 10s. to 15s., and 1s. for any sum from 15s. to 20s. I regret to say that, in some instances, the proprietor rents his shop to a grocer at a high rate, and takes poundage too. Poundage is more in favour with the men than stores, although it is evident that they in this way pay first the interest to the owner, and the profit to the grocer.

As in slavery there were masters who treated their slaves kindly, so, also, there are masters who treat their workmen kindly in respect of truck, but the system is bad at the best—moreover, it is illegal, and it is wonderful how owners, some of them Members of Parliament, resort to all manner of means to evade the law. It is very easy to write on both sides of the question, but in a lump it is bad; and I think it would be fair to all parties if Parliament were to legislate that every workman, whether collier or any other man, should every third day be entitled to be paid within two miles of where it has been earned four-fifths of the money he has earned, and be paid the balance fortnightly or monthly, at the latest. Of course, if he did not choose to take any money he could get it at the end of the fortnight. There would be no more difficulty in doing this than in the present mode of advancing for stores and poundage, and I am glad to say that there are many masters who now advance money in this way without truck in any shape. This would complete the Arrestment Act, which is otherwise incomplete—indeed, it is more a part of that Act than the Mines Inspection Act, and I do not see how it is to be worked without some such provision.

A COALMASTER.

MINING IN SHROPSHIRE—No. III.

[The series of letters commenced in February, and continued in the Supplement to the Journal of March 5, having been interrupted in some way or other by the miscarriage of the parcel to the office, I will now endeavour to supply the missing links.]

SIR,—The mining districts in the neighbourhood of the Roman Gravels, Snailbeach, the White Grit, and Shelve comprise a country comparatively little known to the tourist, yet one, nevertheless, of singular variety of feature, and one which has for ages been associated with mining enterprise. It is situated upon the borders of the Welsh counties, and on a clear breezy day fine views are obtained of the immediate valleys, gorges, hills, and distant mountain ranges. I know of no greater treat than to ramble over a portion of the Longmynds and the Stiperstones, in the direction of Shelve, for one in whom a love of nature and of science are combined. In the deep furrows, narrow valleys, curious ravines, and on the sloping sides of a cluster of innumerable hills evidences of attempts made to ascertain the mineral character of the ground frequently appear; but no mining operations that we know of have yet been very successful on the south-eastern side of these hills, a fact which, considering that the strata underlie the rich metaliferous rocks of Shelve, may seem a little singular. The Longmynds rise about 1600 ft. above the level of the sea, the rocks are 2600 ft. in thickness, and consist of those fine sedimentary matters the accumulation of which must have been going on for periods of vast duration, with here and there sand-rock and pebble-beds, sufficient to remind one of the fact that they are representatives of former hills and pre-existing rocks.

In following the Longmynds from east-south-east to north-north-west, you pass that singular and romantic looking sandstone ridge known as the Stiperstones, which contain frequent traces of copper, and which dip under the schists, sandstones, and grits of the Landeilo lead-bearing formation of Shelve. These latter series of schists, sandstones, and grits come in in parallel masses, and are 14,000 ft. in thickness. In crossing over these hills the bent, twisted, and broken character of the rocks afford evidences of those tremblings and convulsions of the young earth to which we are in a measure indebted for our metaliferous veins. Great longitudinal fractures run on either side the Stiperstones, affecting not only the Longmynd but the Wenlock Valley. The great rents crossing these on the east side run north-west by west, and the principal ones on the west side run east by north. The form of the corndon is due to the intersection of the lines of faults running parallel with the Stiperstones and the easterly set, in which the rich minerals of the Shelve district chiefly occur. The rocks are chiefly fine-grained schists, occasionally containing mica, and are readily decomposed by the atmosphere: they are interlaced with conformable sheets of igneous matter, or grits, showing that volcanic action affected the bed of the sea, adding to the depositions during the process of piling up these sedimentary strata, as well as long afterwards, by which subsequent eruptions, dislocations, intrusions, alterations, and changes they became metaliferous. It is now pretty well understood that the rocks on these high grounds about Shelve correspond in geological features with the still loftier hills and mountains of North Wales. This district seems to have been equally well known formerly as at present for its great mineral wealth. Not only the Romans, but the ancient princes of Mercia, and the great feudal proprietors of later periods, appear to have been aware of their value and importance, and interesting records are in existence respecting them.

Shelve in the 13th century was held to be within the royal forest of the Stiperstones, termed in the old records "Tenfrenstanes," over which Peter Corbet, of Caus Castle, claimed, on the ground of immemorial custom, the right of free chase, except that the men of the district had been used to hunt the fox and the hare only. Henry II. held the Stiperstones Forest, and engrossed the whole, or a great part, of the profits of the Shelve mines, owing to Corbet, baron of Caus, being in disgrace. Thomas Fitz-Bernard, a justice of the Forest, some time between September, 1179 and 1180, leased the lead mine of "Schelfe to one Nicholas Poncier for one year," at a rent of 55*l.*, to be paid by even instalments at Easter and Michaelmas following. At the same date Hugh Pantulf, sheriff of Shropshire, is found charged with "55*l.* for the king's lead," as sold by the justice of the Forest; and he accounts for it the following year by showing that in consequence of an order from the king he had delivered it to the king himself to the full amount. During the then current half-year Bernard, justice of the Forest let mines for 40 marks (26*l.* 13s. 4d.), for which sum Hugh Pantulf accounts by showing that he had forwarded 60 cart loads, of the value of 21*l.*, for the king's use; and that he had paid for the carriage of such lead, and of 120 cart loads of other lead, to Gloucester, by the king's order, the sum of 5*l.* 12s. 10d. He now paid a balance of 6d. into the Treasury, and was quit.

In 1182 the king appears to have had these lead mines in his own hands, for the sheriff is reported to have conveyed the king's lead from Shrewsbury to Gloucester, at a cost of 389*l.*, as certified by witnesses. He had, it appears, also further purchased 110 cart loads of other lead for the king, at a cost of 38*l.* 10s., which lead appears from the description to have been designed for the Wiltshire convent of Amesbury, which had been dissolved in 1177, on the ground of immorality, and was afterwards colonised with a purer sisterhood, and became the retreat of members of the aristocracy. The lead mines of Shelve doubtless, therefore, furnished the material for the roof of that conventual establishment, which was opened by Henry, the Archbishop of Canterbury, and Bishops of Exeter and Norwich, on May 31 in the above year. The accounts of Hugh Pantulf, the sheriff above referred to, also show the same diligence in respect of lead forwarded to Gloucester. In 1183 thirty cart loads cost 10*l.* 10s., and the carriage thereof 18s. 9d. In 1184 there was paid 4*l.* 11s. for lead, and 8s. 3½d. for carriage. In 1185 the carriage of 30 cart loads, sent from Shrewsbury, had cost 1*l.* 8s. 9d., and the carriage of 30 cart loads, sent direct from the mines, had cost 2*l.* 6s. 3d.

In Robert Corbet's grant to Shrewsbury Abbey (about 1220) he gives the tithes of his share only of the produce of the Shelve mines, while Thomas Corbet's grant of 1270 contains no such limitation. Thus we find that the richly endowed Norman monastry of Shrewsbury, founded by Roger Montgomery, derived a portion of its income from the lead mines of Shelve.

Mr. Robert Jasper More, who before the last general election represented the Southern Division of Shropshire, is the proprietor of a large portion of property stretching seven miles in the direction of Shrewsbury, as his ancestors, who first settled here at the Conquest, have been before him. Indeed, you everywhere meet, not only with indications of mining operations having been carried on here at very remote periods, but with evidences of antiquity both in the mines themselves, in which the most primitive-looking tools have been found, and in the presence of tumuli and entrenchments, and those mysterious circles of stones supposed by some to be of Druidical origin. It is no wonder that early mining operations were carried on here when it is understood that seven veins of lead at least must have cropped out on the western side of the hill, to tempt the Roman miners, who evidently began operations where each one cropped out, and followed it into the hill as far as they were able. Near the Gravel Mine, itself a modern work, two or three such veins cropped up almost parallel; and here these hardy, enterprising masters of the country cut great slices out of the hill from top to bottom. This corresponds so closely with Pliny's description of lead being obtained at the surface of the ground so abundantly in Britain that there appears little doubt of this district having been the place referred to by him. Pliny described it as being so abundant that a law was passed to limit the quantity taken each year; and the late Mr. More calculated that 60,000 tons have at different times been raised in the small parish of Shelve alone. Mr. More has a large and very excellent model of the estate at Linley Hall, which was made by his father and the present agent of the estate, with great care and labour, from the Ordnance Map, in which these and other veins of lead, and the workings in search of them, are laid down. It is an interesting and valuable model, and if Mr. More could be induced to allow a representation of it to appear in the *Mining Journal* it would, I feel persuaded, be looked upon with great interest, and would be of great service to those interested in mining operations in the district. This model shows, as stated in the *Mining Journal* some five years ago by the agent, Mr. Whittal, that 1¾ mile of the Shelve hill, which is on the western side of the parish, is in the Grit sett, and the remainder of the hill, which is 2 miles long altogether, in the Roman Gravels sett. The Grit sett appears to be intersected by 18 various mineral veins; and these two mines have, it is calculated, produced altogether 120,000 tons of lead ore, at a depth not greater than 50 fathoms. The Bog, Penelly, and Snailbeach Mines, however, in the same district, are represented as treble this depth. The Shelve hill runs nearly north and south, and the mineral veins cross it chiefly to the south-east or north-west. The great leading vein, called the Rider, is distinguishable by the tolerable straight, unbroken line it maintains in its course through the district from east to west; and a vast quantity of lead ore has been found in it, as well as in several others which form a junction with it. Mr. Whittal says that one south vein had produced 9000 tons of lead ore within 20 years. The numerous great arteries, veins, and cross-courses which intersect this rich mining district are very instructive and remarkable. There is a strong cross-course, for instance, passing through the district, and crossing the hill nearly north and south. The way in which a metaliferous vein becomes suddenly deteriorated or enriched by a junction with an outburst of rock, or a junction of rents, and the deviations in search of the missing ore are curious. J. RANDALL, F.G.S.

Madeley, May 16.

MINING—PAST AND PRESENT.

SIR,—Now that the *furore* has subsided, and people have proper time for reflection before rushing into matters merely by the force of example, it would be wise for those who have not acted in the manner described to pay a visit into Cardiganshire, where they can now select equally as good or better properties for the same number of hundreds as was paid for others in thousands six months ago.

I will venture to assert that there are now some half-dozen properties that with a small amount of capital would enter into a profitable state in from six to twelve months, and that no better field for legitimate mining exists at present than this county, either in or out of the United Kingdom. ABSALOM FRANCIS.

Goginan, May 16.

METALLIC MINING IN THE NORTH—No. III.

SIR,—It is at all times instructive to see discussed in your columns the advantages that different mining districts present for the profitable investment of capital. It is mainly by disseminating accurate information concerning the capabilities of little-known localities through the appropriate medium of the *Mining Journal* that the necessary publicity can be best attained which may prove beneficial alike to industrial and capitalist; and it is to be hoped that alongside of this, correspondence having for its object the elucidation of the peculiarities that distinguish, however slightly, every metallic district and reliable working facts based thereon, may be more extensively recorded in future issues than heretofore by individuals of extensive local experience, and thus collect data which is sure to be of great value in future exploration of mineral ground.

Those engaged in mining pursuits in Devon and Cornwall early saw the advantage of enlisting the aid of out-adventurers in energetically working the valuable mineral deposits that distinguish that part of the kingdom; hence they have since always bulked largely in the public eye, and reaped to the full the almost exclusive command of speculative enterprise, to the comparative neglect of other places. However, many of the tin and copper mines there, having been extensively worked in the past, are now so burdened with heavy ever-increasing working expenses that they are peculiarly sensitive to the constant fluctuations of the metal market, frightening timid, would-be investors, who do not possess sufficient nerve to encounter the anxieties inseparable from alternate rise and depression, into enquiry for investments of a more equable character. To meet this demand it is true that of late increased and deserved attention has been directed to other districts, notably the Welsh lead mines, in quest of the desired desideratum; but most of these now partaking of a hazardous character likewise, it is surprising that the professed caterers for profitable outlet for capital seem to be totally oblivious to the fact that the Northern Counties of England present unparalleled facilities for safe lucrative investment, which, without calling in question the laudatory encomiums recommendatory of the foreign mines now floated in such abundance, are not a whit inferior in attractiveness to the general run of mines anywhere, either home or foreign; indeed, the yearly statistics of production unmistakably show that the ancients were not so far wrong in their ideas when they confined their search for lead and copper ore principally to the northern province, and I do not hesitate to predict that the time is not far distant when the moderns will practically endorse their sagacity by exploring and working this immense area on a scale commensurate with its capabilities.

I do not now intend to enter into any minute description of this interesting field; my main object in this communication is merely to direct attention to an inexhaustible source of future lead and copper supply at home, which requires only to be known to secure a share of that patronage which has been mainly withheld in the past, through the diffidence or lethargic character of those chiefly interested. Patriotism and prudence would alike suggest that British mines, other things being equal, should secure the support of native enterprise in preference to embarking in foreign speculations, which, however otherwise inviting, want the all-important need (in mining especially) facility for frequent inspection and supervision. In furtherance of this praiseworthy object, it is to be deplored that an air of mystery has been thrown around the past doings of most of the northern mines, which renders it no easy task to give a correct notion of the results of past working; but it may be truthfully said that when properly conducted, profitable results are almost always a certainty; while from the mountainous conformation of the mineral ground, and the numerous streams everywhere abundantly present, very little outlay is required to develope and work the great majority of the mines. With your permission, I will return and dwell more particularly on the subject in a future letter. W. GIBSON.

Caldbeck, May 11.

MACHINERY AND MATERIALS FOR FOREIGN MINES.

SIR,—Being a large adventurer both in home and foreign mines, allow me to suggest, through your valuable Journal, the desirability of mining companies sending a practical man, of sterling integrity, to see such materials as they have ordered weighed, and also to see that there is not more metal in each casting than is necessary. I have heard such practices have been resorted to—merely to add weight to increase the large profits of jobbing foundries. Should my suggestion be adopted, this system would be scrupulously avoided, especially on sending an individual who is proof against the seductive baits of Michaelmas dinners, &c. All this must be paid for, and for my part I would rather see my money spent in the legitimate working of the mine than in the purchase of unnecessary metal, entailing heavier cost in freight, land carriage, and a still heavier cost of labour and loss of time, with extra amount of risk in breakages, &c., at the mines, fixing those unwieldy outrages on honest trading.

Durham, May 16. J. W. FERGUSON.

RHENISH PRUSSIA—No. XI.

SIR,—One was little aware until the articles on Prussian Mining appeared in your pages how extensively the *Mining Journal* is read in Germany, but the local papers, and the discussions amongst the miners and mining officials, show that their eyes are upon you.

The last article, on Phœnix, has been discussed; the figures cannot be impugned; the profit of 175,800*l.* will, should the lode continue to hold good, be returned, but I had omitted to allow time for the cross-cutting to the lode, and the time for taking away the ground may not be sufficient, therefore allowance must be made for these.

St. Josephsberg is again most prominently before the German public. The 60-in. cylinder, which is to pump the water to cut the lode under the old workings, which were only 45 lachters under adit, is expected to go to work next week, and Hadley's shaft, now completed to the adit, will be sunk at the rate of 4 fathoms per month; and as I presume that a cross-cut will be driven to intersect the main copper lode and the lead lode, in the 55 lachter level, in 18 months, the great courses of ore, which have produced such immense profits will be again opened up. In about four months the Leopold lode will be cut into 10 lachters under the adit, and the large quantities of ore ground left standing above the 20 lachter level must soon be unwatered; but I presume that a full report of this mine will appear as soon as the engine is set to work. There are two good drawing-engines and one dressing-engine, with the necessary appliances, on the mine.

Clementslust, the favourite mine of the district, is now passing into the hands of English capitalists, and it is intended to form a company with, I am given to understand, a capital of 60,000*l.*, to work it efficiently. I am very glad to see the report of the immense discoveries of ore made. The names appended to these reports are a guarantee for their correctness; but on a recent visit to the mine I was underground with these reporters, and the Representant produced the statement of ore returns, the price of sinking shafts, driving adits, stoping ground, and the assay of the ores sold, all sealed and attested by the Government officials, and surprised me much by the extent of ground laid open (187 lachters) on this splendid lode, which is only 27 lachters under surface in its deepest level, and the last 23 lachters opened up by cross-cuts, as described in the report in the last *Mining Journal*—astonished from their richness, even after having seen the lodes in Marienberg and St. Josephsberg. About twelve months since the Government valued the ore at surface, and the lode above the 27 lachter level, as worth, after deducting the cost of returning, 100,000 thalers, or 15,000*l.*

The following is an extract from the report of one of our very best English miners, made in the early part of this year:—"I consider the mine has discoveries which may safely be valued at 30,000*l.*, after all costs of returns are deducted." The same agent reports—"The per fathom value of this ground would, at the present price of copper, amount to upwards of 26*l.*" Capt. Trevillian, of Herodsfoot, closes his report in these remarkable words:—"I am sanguine to believe that this mine will prove, by good management, one of the best copper mines in this country." And when Capt. T. Trevillian is "sanguine" no other man need fear, for he goes by the name of "the wet blanket." That great philosopher, geologist, and practical miner, David Forbes, F.R.S., winds up his report in not less decided language:—"This mine, under judicious management, cannot fail to prove a thoroughly profitable and lasting investment." But all these reports were made before the discoveries of the last two months, reported on in the *Mining Journal* of the 14th inst., which certainly doubles the value of the mine. Herr Obersteiger Muhlenbein, who managed Marienberg and St. Josephsberg (the two leading copper mines of Germany) for many years, concurs with the well-known Herr Schwartze, of Remagen, and the Steiger of the mine, in stating "*this is without doubt the best copper mine in Prussia*," and well may they do so. When speaking of the 27 lachter level they said:—

"This level being in whole ground, and the end driving south being as good as any part of the level, was discovered over the 27 lachter level; 16.8·0*l.* worth of ore in the last two months, more than 30 tons, have been broken and brought to surface by 11 men, of an average value of 12*l.* 10s. per ton, worth over 625*l.*, at a cost not exceeding, *including all expenses*, 80*l.* The stone of ore sent to the office of Mr. Wilson, 20, St. Helen's-place, London, was taken yesterday from the south end of the lode, in our presence, and is well calculated to show the character of the lode. The weight is 393½ Prussian pounds, equal to 433½ lbs. English weight."

They might have added, as the fact was, that this stone of ore was broken from a rock full 1½ ton weight. The estimated cost of a 40-in. cylinder steam-engine, drawing-engine, dressing-engine, crusher, &c., and two shafts sunk each to the 60 lachter level, and a small tram to connect this mine with the railway from Cologne to Frankfort, which will be opened on the first day of August next, is 10,000*l.*

OUR CORRESPONDENT.

MINING ON LAKE SUPERIOR.

SIR,—Lake Superior I presume is, not unlike other copper mining districts, at or very near low water, and when the tide will return with any activity is very uncertain. Thus, the Ontonagon Company, which one time employed large numbers of miners, does not now find occupation for 100, and if 75 of these should leave of their own will they would not be asked to stop, although there are none to take their places; such is the disposition of mining companies towards working their mines. Yet there are some of those mines, under care and good judgment, which would pay a profit even at the present price of copper. The once famous Minnesota Mine is now suspended, with the exception of a few tributers, who, if acquainted with the workings, will in all probability do well, unless they make it their grave, as the whole mine is fast crushing together. The company continues work on the south part of their property, on what is known as the south range, and under favourable prospects. The lodes on this range have no walls, neither the lode nor country rock are stratified, but all in one body. Slides, however, are frequent, running at right angles with the lodes. The lodes run about 40° north of east and south of west, with a northerly underlie. The cross-courses run about north and south, sometimes they underlie west, and then again east. Most of the copper is subject to those cross-courses, where the lodes make very wide—from 5 or 6 feet to 20 and 30 feet. Some little distance from those cross-courses the lodes narrow down to 3 or 4 ft., and at such points are generally unproductive, and sometimes indistinct to

follow. The character of the rock is there the miners' guide. From 16 to 18 ft. sinking of a shaft 8 ft. by 12 ft. is a reasonable month's work for six men, and about the same number of feet in a common size drift for a month by four men; 10 fms. of mining measure is good stoping for a month by four men. Those figures will about average in mines on the south range. On the conglomerate, which serves as a footwall to the Minnesota old lode, and also the National, openings are made at a much less figure. In sinking six men can progress 25 to 30 ft. a month, four men in a drift 30 to 35 ft., and in stoping 20 fms. running measure.

Flint Steel, some two miles east of the Minnesota, have opened on a lode on the south range similar to the Minnesota. They have 24 heads of stamps on the ground ready for erection. The battery consists of three shafts of cast-iron, 14 in. diameter in the bearings; each shaft or axle with drums keyed on, weight 10 tons; square heads and lifters—the head and lifter weigh 10 cwts. The principle of lifting is the Cornish plan—tongue and tappet; but instead of the beds to stamp on being of rock beaten into the earth they have a large mortar for each cover, full size of cover, and about 14 in. thick. These mortars are to be laid upon square timbers, and the timbers rest on clay. The engine is low pressure, built by Messrs. West and Co., of Philadelphia. The engine and stamps, ironwork, weigh 120 tons. The machinery is put up ready to run, and a railroad half a mile to the mine is estimated to cost $60,000. Their mine is down to a 20 fm. level, and (say) 300 ft. in length. Three times the amount of openings filled with miners could not supply 24 good heads.

Caledonia seems to weather the storm, by about 26 miners; they have 16 heads of Gates's stamps, but I am sorry to notice the mine is very poor. This, with the very low price of copper, naturally make the company feel dissatisfied. The Evergreen has dwindled down to 10 miners, picking out its eyes, and leaving the main work for a future day. They have had a good mine for years, but where the money went to is for some one to find out. Ridge is a good mine, but they are only working in accordance with the present price of copper—about 25 miners. These mines are all on the south range.

Great fears are entertained whether the Portage Lake mines will storm out the summer, the Quincy being the only one paying, notwithstanding how much copper all of them have taken out—from 50 to 150 tons a month of 70 to 80 per cent. for ingot copper. Calumet and Hecla are now sending their mineral to Portage Lake Smelting Works on a cart for 5½c. per pound of 80 per cent., which is scarcely 7d. for ingot; then add 1½d. a pound for transportation, insurance, agency, &c.—total, 8¾d., with present price of copper 19½d., leave them a profit of 11d. on every pound of ingot copper. There was no cost spared in adopting the best kind of machinery—in fact, in laying the mines out generally every advantage was taken, and to-day they are reaping their reward; but with all the old adage is—Soft ground makes a good miner, while a good bunch of mineral makes a good tributor. A CORNISH MINER.

Ontonagon, Lake Superior, April 10.

THE JAVALI MINE.

[The following letter, which has been addressed to the managing director of the Javali Company, has been forwarded to us for publication in the Journal.]

SIR,—I was very much surprised to read, in the *Mining Journal* report of the Javali Company meeting, that your superintendent should have penned such a disparaging report on the prospects of the Javali Mine; and I consider that the body of shareholders adopted a very judicious course in rejecting the report *in toto*. From my long experience of the district and knowledge of the Javali Mine, I can assure the proprietors that their property has been considerably undervalued, and that there is not the least cause for alarm.

The Javali is situated on the only champion or master lode as yet discovered in the locality. The lode is an immense width, its character is extremely satisfactory from its natural formation, consisting of hard quartz, with the gold disseminated throughout the rock; and I see no reason why the lode should not prove productive in depth. It is possible that a poor bar or channel of ground may be met with, as in all mines, but it might prove, as often is the case, even more productive on the under than the over portions.

The Javali possesses an inexhaustible supply of quartz; I should say that with proper concentrators the produce cannot go below 15 dwts. to the ton, and I think an ounce to the ton will be even reached. I see no reason why your lode cannot be taken out in bulk; but, on the contrary, only put up sufficient stamping-power, and adopt the system of stoping and filling in from the surface, the cost of stoping will not reach one-half that of driving. Your mine is most advantageously situated for all mining purposes.

I have no doubt that the hypothesis of quartz mines becoming poorer in depth was advanced from information gleaned in reference to the numerous small quartz veins that traverse the Chontales country. These veins do not possess any defined walls, and mass the gold near the surface, in a very flat underlie, and in the decomposed parts, composed of clay and quartz, the former of these invariably carrying the gold, whilst the quartz is entirely barren. In getting down 4 or 5 fms. the vein becomes almost perpendicular, and the country, or accompanying rock, changing to a hard, compact nature, the clay portion of the veins gets so squeezed up as to disappear altogether, giving place to the large, hard, and unproductive quartz rock. The Javali Mine, it must be remembered, is different altogether from these veins; it is a hard lode of quartz, bearing the gold in the rock, of great magnitude, and with a regular defined underwall.

St. Ives, Cornwall, May 12. J. WHITE.

NOVA SCOTIA GOLD FIELDS.

SIR,—The April returns not being yet to hand, perhaps the following summary of the past fortnight's news will interest the readers of the Journal.

The first conviction for stealing gold-bearing quartz was obtained last week, after numerous futile attempts during the past few years to bring depredators to justice. The different acts of the local Government always afforded a loophole for escape and legal quibbling; but the Dominion law of 1869, under which this conviction has been secured, is likely to prove a wholesome restraint upon the too prevalent crime of specimen stealing.

The local Legislature has just closed, and during its lengthened session passed the following charters:—Sydney Coal Mining Company, Northern Head Coal Company, United Mining Association of Nova Scotia (Limited), Spring Hill Gold Mining Company, El Dorado Company, New Victoria Company, Humber Gold Mining Company, Burlington Company, Sterling Company, St. Andrew's Gold Mining Company of Halifax, Globe Gold Mining Association, the Aconi Gold Company, and a charter to revive and continue the Act to incorporate the General Mining Association. A charter here costs only 4*l.* sterling, and no influence is required to get it passed, nor is there any extra charge made for the length of name, and thus the Great Consolidated Mining Company of Nova Scotia (Limited), with a nominal capital of 100,000*l.* sterling, was actually chartered last year before one penny of the capital was subscribed, or one foot of land owned.

The apathy towards gold mining enterprise is still general, and the Americans that have been successful are trying to realise and withdraw. The West Lake property at Uniacke, which at one time yielded 18 ozs. to the ton, but since dwindled down to a few pennyweights, was sold last week under attachment for $8000, and then the price was run up by the Ring, who propose offering it in England. The properties on either side of the El Dorado, at Wine Harbour, are also levied upon by the Court; and a sale of the Provincial, the eastward adjoining property, will take place next month at Montreal. Such is the discouragement brought about by natural and artificial means that a property at Sherbrooke, with a new mill on it that cost nearly $7000, and roads which cost several hundred dollars to construct, actually sold for 275*l.* sterling. Part of the Hyde property, at Musquodoboit, was sold this week by the sheriff for 40*l.*, a property on which about 3000*l.* had been spent in roads and developments. The cause of this depression will be explained in a subsequent letter. A bar of 50 ozs., the result of 360 days' labour and the crushing of 16 tons quartz, was brought yesterday to town from the Touquoy Mine, at Musquodoboit, and 62 ozs. are reported as last month's yield of the El Dorado. This last is the property whose former manager in despair committed suicide, and which, nominally stocked for $1,000,000, and having cost the original shareholders $200,000, was passed under the hammer in January for $4800, or less than a thousand pounds sterling.

Again something has happened to prevent the completion of the past year's general report, but the following extract shows the principal data for each district:—

	Total yield, 1860-69 inclusive, in ozs.	Yield per 2000 lbs. Oz. dwt. gr.	1862-69 inclusive. Daily per man.
Waverley	46,409	0 11 19·5	3s. 2d.
Sherbrooke	45,190	0 19 11·5	11 11
Renfrew	26,682	0 16 9·3	8 3
Wine Harbour	17,762	0 14 5·9	7 11
Isaac's Harbour	9,774	1 5 20·7	4 10
Oldham	9,254	0 16 8·8	4 10
Uniacke	7,491	0 15 1·5	8 4
Tangier	6,834	0 17 3·2	3 2
Montague	5,111	1 12 14·5	5 8
Ovens	2,337	0 15 13·1	3 6
Musquodoboit	1,101	0 12 15·5	7 4
Unclassified	919	0 9 8·9	2 4
Laurencetown	586	0 13 3·8	1 11

The mean average of crushing 200,554 tons 18 cwts., colonial weight of 2000 lbs. per ton, from 1862 to 1869 inclusive, was 15 dwts. 15·3 grs.; the mean daily yield per man, $1 77·3 (7s. 2½d.); and the value of the total product since 1860, declared and unreported, 717,800*l.*

Halifax, Nova Scotia, May 6. ACADIENSIS.

MINING IN COLORADO.

SIR,—Some idea may be formed of the extent to which the mines of Clear Creek county, one of the smallest in the territory, have already been developed by the list of mills and reduction works actually at work in it. Franklin Silver Mining Company amalgamating works has a capacity of 5 tons per day; Whale Mill, amalgamating and smelting, Spanish Bar, 10 tons; Fairmount, amalgamating works, Hukill Gulch, 5 tons; McIntyre, amalgamating works, Mill Creek, 5 tons; Swansea Smelting Works, Swansea, 8 tons; Wilson and Cass Company, dressing works, Georgetown, 20 tons; Stewart's Amalgamating Works, Georgetown, 20 tons; Hupeden's Amalgamating Works, Georgetown, 8 tons; Brown Silver Mining Company, smelting works, Brownville, 4 tons; Baker Silver Mining Company, amalgamating works, Bakerville, 20 tons; International Silver Mining Company, amalgamating works, Argentine, 5 tons: making a total capacity of 110 tons. This does not, however, include all the mills in the county, but merely such as are suited for treating silver ore. With 16*l.* ore these mills have a capacity, and are capable, of turning out 500,000*l.* of silver bullion per annum. The following are the latest items of interest concerning the mines of this county:—

The MAMMOTH LODE, Brown Mountain, has now 18 in. of solid mineral. One blast last week (April 2) threw down 11 tons of ore, and during the last month one drill has produced enough ore to yield, with 80 per cent. saved, 200 lbs. of silver.

The ore vein in the SEATON LODE, Idaho district, is now very large. Work is being actively carried on in the mine, and most of the ore is sold to Prof. Hill, of Black Hawk, for from $75 to $100 per ton of 2000 lbs.

The owners of the GRIFFITH LODE are in "bonanza;" a strike of rich ore has been made in the lower drift. The body of ore is unusually large, and quite as rich as that furnished by other good lodes. This is a significant fact, and one worthy of note, as it shows what depth in a mine will do. The Griffith heretofore has been noted for an abundance of ore, rather than for the richness of the same. Now, however, the mine may be said to be noted for both the abundance of its ore and its richness.

Work has re-commenced on the STERLING LODE, celebrated for the unusual richness of its ores: 1 ton (2000 lbs.) shipped to Newark, New Jersey, last fall for treatment, yielded $927 coin.

Another contract has been let on the MARSHALL TUNNEL, the price being $26 per foot. When the contract shall have been completed one of the richest belts of lodes in Clear Creek county will have been struck—the Equator, Compass and Square, Panama, Indigo, Tom Thumb, and Argentine; these are all good lodes, containing an abundance of rich ore, some of which, as that from the Indigo, ran as high as $1 per pound.

Nine and a half tons of SNOWDRIFT ore, sent to Newark, N.J., for treatment, gave a return of $693 in silver to the ton (2000 lbs.) of ore, or a grand total of $6583·50 in coin as the product of the 9½ tons. No words of praise can add to the impressions produced by results like this.

The WHITE LODE, in Griffith district, near Georgetown, was discovered in June, 1867. The lode is situated high up on the slope of Sherman Mountain, 1600 ft. above the level of Georgetown. The work done has been limited, but sufficient to develope a vein from 1 to 3 ft. in width; the upper wall is solid, the lower broken, and distant from 3 to 5 ft. A working shaft has been sunk to the depth of 35 ft. on the discovery; the deposit consists of sulphuret of silver and argentiferous galena: 14 tons of the ore from this experimental development, worked by chlorination, yielded $200 per ton (2000 lbs.)—*British and Colorado Mining Bureau.* W. COPE.

MINING IN COLORADO.

SIR,—Since my last communication, which appeared in the Supplement to the Journal of March 26, contracts have been entered into which insure the completion of a railroad to this place within the next 18 months. This will afford an easy and cheap transportation to our mines for an abundant supply of excellent coal from the immense coal beds on the Plains, as well as facilities for the shipment of ore from the mines to the reduction-works, which are to be erected on the Plains, or to England, as the case may be. This advantage of cheap and quick transportation must result in a great benefit to the mines here, and impart new life and importance to mining interests. Every facility and inducement are afforded by the Government to miners and prospectors for the purpose of encouragement in the opening of mines, and the discovery of new ones. No tax or royalty is charged for the use of the public lands for mining purposes, and all the timber required is procured from the public or Government land free of charge.

Mining is opening up this spring with better prospects for the country than ever before. Hundreds of mines are at present being worked by individual enterprise that have been for years abandoned, owing to the high prices of labour and material which prevailed here for the four years last past, in consequence of costly and slow transportation and the unsettled state of the finances of the country. Now that the latter has become more settled, and transportation by railroad offered, wages and the cost of mining have been reduced more than half, and again mining is being resumed in earnest. The yields of the mines are generally satisfactory to all concerned, and altogether the country never had so bright a prospect before it.

Present appearances would indicate that the aggregate yield of precious metals by the territory this year will be much more than double that of any year since the settlement of the country. The people seem to be inspired with new life, and that perfect confidence in the richness of our mines which alone can ensure success in mining, as in other business. Now the mountain sides are the scenes of life and activity, where but a few months ago the quiet of Nature was undisturbed. The Nevada mining district particularly presents a busy scene, and is the banner district of the territory for the number, richness, and extent of its mines. Among the best lodes of this district which I have examined I will mention, as possessing especial merit, the California, Gardner, Burrough's, Kansas, Symond's Forks, Flock, American Flag, and Jones's lodes, all of which are first-class veins, and their yield per annum may be counted by millions of dollars.

There are many other lodes in the district worked with greater or less success, but not having examined them I cannot speak as to their value. The "California" I mentioned in a former letter, but owing to the notoriety it has recently acquired I wish to speak of it more fully. Although discovered several years ago, it is only within the last year that particular attention has been drawn to it. For extent, width, uniformity, and richness of the vein, and ease with which it is worked, it is certainly unsurpassed by any mine within my knowledge. It is laid open by numerous shafts for a distance of more than 2000 feet in length, and the whole of the ground has yielded uniformly rich ore, where the requisite depth (usually 300 feet) has been attained. The Joy vein will average in width fully 5 feet. Could a portion or all of this lode be procured by one of our substantial English companies, who would inaugurate a more economical system of mining, and erect good machinery and works for the reduction of the ore, I am sure a better investment could not well be made. This week I am going to an adjoining county, to inspect some copper mines of reputed richness; when I return, if I find anything that is likely to interest your numerous readers, I will give you the benefit of my observations. JESSE ARCHIBALD.

Central City, Colorado, April 19.

CALIFORNIA MINES, AND ENGLISH CAPITALISTS.

SIR,—It is nearly twenty years since I came to California, during which time I have been a diligent observer of events passing throughout this great mining country. I have seen mines and villages spring up like mushrooms—and, like mushrooms, have passed away. I have also seen thousands of men who were strong believers in predestination, guided by the paralogy of some would-be divine, and every man had an imaginary fortune in perspective. From placer mining sprang up quartz mining. It must be remembered this is a different class of mining, and requires a different class of men to work the mines. Here the services of the practical miner are called into requisition, and under the management of the most scientific men hitherto failures have been many and disastrous—the English capitalists being the principal sufferers, owing to incompetent men being sent out from England to manage the affairs of mining. Mariposa Mines (according to the scientific Englishman's version) were not worth a cent, and the Washoe Mines valued at a pound of candles. But years have rolled by since then, and I am sorry to say the practical and intelligent California miner has made no progress in the science of mining, unless he believes in the doctrine of *arti est celare artem;* and in the opinion of foreign capitalists he stands either as an object of misplaced confidence or a member of the unrighteous family. Hence their persistence in sending coal to Newcastle, and constantly pouring new wine into old bottles—an idea pregnant with imbecility, bearing a very dangerous tendency towards unfortunate operations.

But what knowlege can be obtained by looking at a mine for one hour? Yet upon such meagre inspection tens of thousands—nay, hundreds of thousands—of dollars have been invested, and the result in almost every instance has proved a failure. I must confess that of all men the California miners are *not* the most righteous. When an English reviewer and a Cornish expert are expected to examine a mine there have been instances when a quantity of rich quartz has been kept in the mine for a considerable time, and also rich ground most carefully husbanded, pending, of course, the new arrivals; the day, hour, and minute is generally known when they will arrive on the mine—so on the morning of that day everything is put in motion with such *sang froid* as if drawing rich quartz and working rich ground was a daily occurrence. After the exchange of preliminary courtesies, the programme for the inspection is arranged. The first (general) performance is to exhibit a few rich specimens, which from time to time have been put in what is termed the specimen safe. From the office they next repair to the shaft to view the rock then drawing up from the mine, which, of course, is pronounced to be exceedingly rich. At this point a separation generally takes place. The reviewer, with some few of the company, examines and takes notes at surface, while the expert, attended by the wily superintendent, descends below to perform the same duty underground. The first thing to be done is to examine the place where the rich rock is being taken from. After a few minutes spent in examining this place, which is said to be wonderfully rich, the following dialogue takes place:—

Sup.: "Take a seat, Sir. You see you are not deceived, and the mine is equally as rich, if not richer, than reported; but the trouble is we have not capital to develope the mine so as to work it to advantage. Had we (softly smiling) had capital at command, like you English, why tons upon tons of gold could be taken out of this very mine." Then, as if forgetting himself, he abruptly says—"By-the-bye, do you smoke? Take a cigar, Sir."—*Exp.*: "Thank you."

Sup.: "You Englishmen know as well as we Americans the truthfulness of the old proverb that 'money makes money;' and here (pointing at the stopes) you have it before you in any amount."

By this time, either by the superintendent's romantic talk or his odorous cigar, the expert's head begins to get giddy, and his eyes obscured by a tint of yellow, so that during his further examination he fancied everything he touched was gold. Whether singular or plural, the fanciful idea follows him or them from California to London, and the veracity of this statement being confirmed in their reports published in the *Mining Journal*—where we read of astonishing mines, the fabulous amount of dividends (imaginary, of course), signed, &c. And this amount of work is done in the incredible time of sixty minutes, and which may not probably last sixty weeks. Oh! shame be unto us, we Californian miners, where is our knowledge! We have men sent a distance of 3000 or more miles whose understanding is infinite, and can tell us, by means of their penetrative eye, more in one hour than we can describe after working in the mines for twenty years. As *in terrorem* to English capitalists who feel disposed to invest in Californian mines I would remind them of the necessity for the inspector, whoever he may be, to remain at least one month, as in California gold mining every day is pregnant with events, when he probably may be in a position better able to judge the value of the property. As it is now you are following the wake of your antecedents, and I fear you will find, perhaps when too late, that hasty inspections and hasty purchases are too closely allied with hasty marriages. There is no blame whatever to be attached to the gentlemen who have been sent here to inspect our mines; they have been just fortunate enough to be unfortunate—fortunate in obtaining a fat fee, and casually a lucrative situation, but unfortunate in representing very lean mines. I know scarcely an instance where any good has emanated from such hasty inspections and jumping at conclusions—failures have invariably been the result.

We have on record an instance of the successful resuscitation of the New Almaden Quicksilver Mine in 1856, under the management of that energetic and foresighted miner, Captain Faull. It is now fourteen years since that gentleman laid the base of operations in this wonderful mine; he worked on his well-laid plans for years, which succeeded so well that his successor never changed them. The result has been an increase of returns from 300 flasks of quicksilver per month to 4000 flasks a-month, and the amount of money paid in dividends has been enormous. Thus, fourteen years have passed away, and an incessant stream of quicksilver continues to flow from the furnaces. Years—nay, this generation—will pass away when amongst all other quicksilver mines the New Almaden will be found pre-eminent—standing as a monument to the memory of the founder of its second birth. I am very much pleased with Captain Faull's letters published in the *Mining Journal*. I once lived in Grass Valley for many years, and know every foot of mining ground in that locality; therefore, I can endorse his letters as bearing the tenor of truthfulness and practical ability. Should this meet the eye of that gentleman I am confident no apology will be required for bringing his name so prominently and deservedly before the public. There is no doubt in my mind but that he is one of the most able miners on the Pacific Coast, and his valuable services rendered to others here ought certainly to recommend him to the notice of capitalists at home.—*San Francisco, April* 16. OBSERVER.

MINING IN MEXICO.

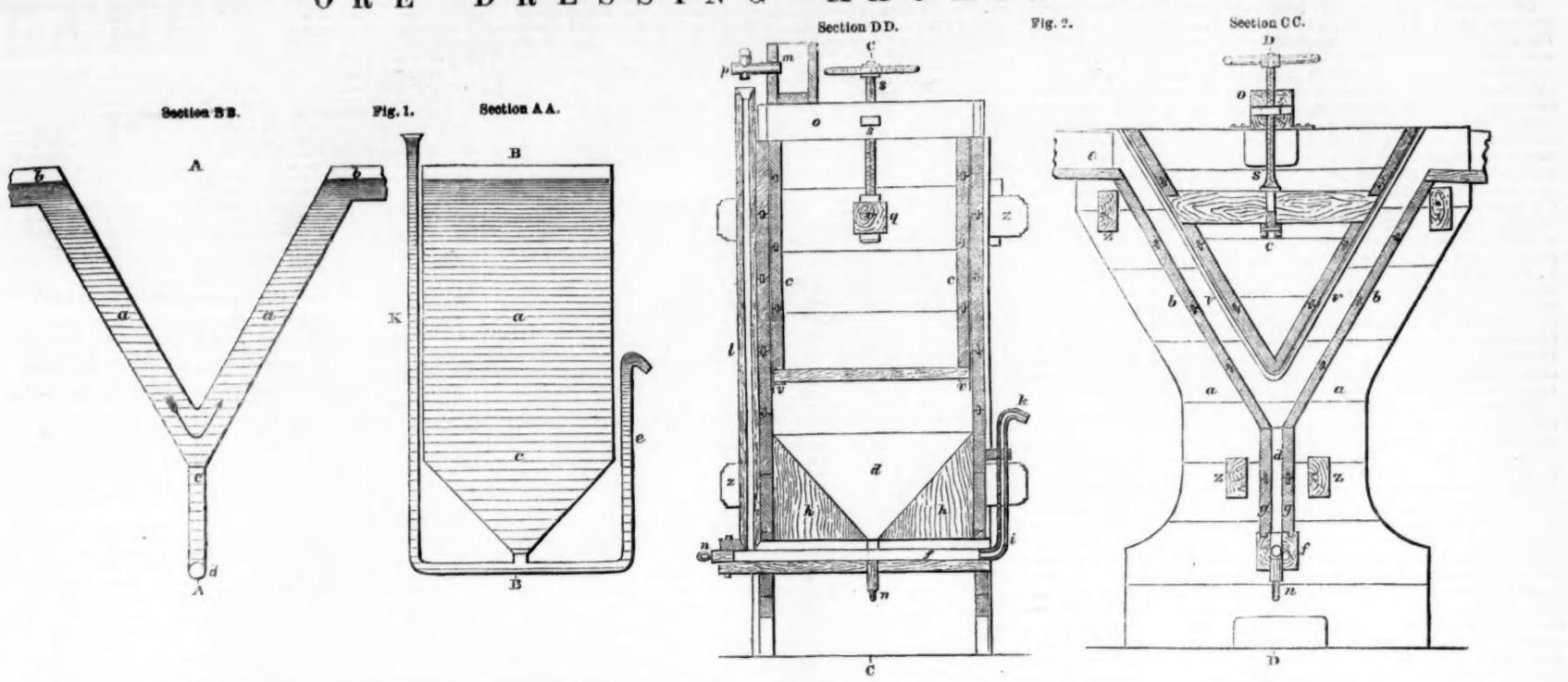
THE CAPULA AND EL CHICO SILVER MINING COMPANIES.

SIR,—We hear of the splendid results given by the Don Pedro del Rey Gold Mining Company, and the great prospects offered by other mines in Brazil, and yet Mexico, infinitely richer in every class of metals, cannot show one really promising company. If Mexico is really such a rich country, how can we account for such an anomaly? It will be my endeavour, by analysing the management and operations of the two companies cited above, to show the causes of their failure, which is the more strange since, amongst their directors, they have had persons who have been in Mexico, or have been connected with that country.

The prospectus of the Capula Company states that—

"In consequence of the want of a private hacienda the owner was induced to offer the mine to the company. That calculations had been made which showed a very large profit, but before any result could be obtained it would be necessary to erect reduction works. The erection of such an establishment would cost 15,000*l.* to 20,000*l.*, and will be proceeded with as soon as possible. The ex-

ORE DRESSING MACHINERY.



SIR,—In my paper upon the Treatment of Auriferous and Argentiferous Ores at Schemnitz, which appeared in the Supplement to the *Mining Journal* of Nov. 25, and the Journal of Dec. 9, 1865, a description was given of Mr. P. v. Rittinger's Classifying and Dressing Apparatus. Since then another classifying apparatus, the invention of Mr. P. v. Rittinger, has been tried at the reduction-works at Schemnitz, a short description of which I have the pleasure of submitting to your valuable Journal, thinking it to be of some interest to the mining public there, for its compactness, exactness, and cheapness. The apparatus (spitzlutten) consists chiefly of three or four pyramidal boxes, with descending and ascending launders (Fig. 1, *a a*), of a rectangular section, through which the stampstuff flows. The launders are inclined 60° to the horizon, and both of the same section in the same box. The section of the launders in each following box is increasing in proportion to the fineness of stuff required. The lowest point (*c*) of the launder communicates with the horizontal pipe (*d*), one end of which receives clean water from the vertical pipe (*R*); the other end discharges the classified stuff through the pipe (*e*). The classification of the stuff is the result of the velocity of the stream in the launders of each box, and of the water-pressure in the pipe (*R*). The velocity of the stuff flowing through the boxes depends entirely upon the section of the launders. The pressure of the clean water in the pipe (*R*), in proportion to the size of stuff to be discharged from the classifier, can be regulated with the height of the said pipe. All four classifiers (spitzlutten) are constructed in a similar manner, and, therefore, the description of the first classifier (Fig. 2) is sufficient to understand the construction of the others.

The boards (*a*, Fig. 2, section C and D) form the vertical sides of the launders, and give support to all the other parts; the sides (*b*), 60° inclined to the horizon, are fitted between them, and form the bottom of the launder, while the movable prism (*c*) is the top; the cross-pieces (*z*) hold the two vertical sides (*a*) together. The launder carrying the stuff to each of the apparatus widens by the in and out let of each of them, and has a greater fall than is required for its normal width, to prevent every settlement of stuff in them. Close to the sides (*b*) is fitted the narrow canal or slit (*d*), which communicates with the pipe (*f*). The wedge-shaped pieces (*h*) are from 45° to 50° inclined, and continue the slit between the sides (*g*) to two square inches by the entrance to the pipe (*f*). With the pipe (*f*) is the S-shaped pipe (*i*) connected, to the upper end of which can be put mouth-pieces of different borings, to regulate the thickness of stuff. The other end of the horizontal pipe (*f*) communicates with the vertical pipe (*l*) for clean water. The apparatus can be easily cleaned when the stopples (*a*) are removed. The section of the launders can be regulated with the prism (*c*) by the set-screw (*s*), which is fastened to the cross-piece (*g*), in the prism (*c*), and the nut (*s*), which is fixed in the cross-piece (*o*). Between the sides of the prism (*c*) and of the pointed box (*a*) must be left a little space, to move the prism easily. Along the edges of the prism (*c*) are nailed leather straps (*r*), to keep all stuff and water from entering the narrow space. In case the quantity of stuff which passes the boxes is always the same, then the launders can be fixed on all sides.

This apparatus proved itself to be an excellent classifier, especially for the coarser classes of stuff, which are generally obtained by crushing and by stamping with grates. The first classes of stuff are completely clean of slimes, and the classification is, therefore, more perfect than the "Spitzkasten." This apparatus requires less fall, and the boxes are of smaller size than those of the "Spitzkasten," and, therefore, less costly. By variable quantities of stuff to be treated they can be easily regulated.—*Idria, May 2.* A. PLAMINEK.

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penses of the London establishment will not exceed 250*l.* per annum; the directors give their services gratuitously until the mine shall be in a dividend-paying state, thus the shareholders will have the full benefit of their subscriptions in the development of their property; that 150 tons of metal could be extracted per week, of an average of 54 ozs. per ton."

Such is the prospectus for which the directors made themselves responsible, and the question is, What have they done to fulfil its conditions? In order to facilitate the extraction of the metal mentioned, communications should have been made from the upper workings to the adit level, to throw the ores down to it, and enable them to be trammed out. This would have given a large amount of produce at a small cost; and if the promised reduction works had been built, Capula would certainly have paid its expenses till the junction of the veins, 50 varas only below the adit level, had been reached, when a great bonanza is expected. Several years elapse under the sole management of the directors since they would not follow the advice of the owner, and then they suddenly turn round and deny the existence of the poor ores, although they have had numerous reports from different persons, amongst others from Capt. Grose, who stated in a letter to Mr. John Phillips, dated as far back as Feb. 22, 1864, that 400 to 500 cargas of ore could be extracted from the workings above the adit with great facility and cheapness. The average of these ores was stated in the prospectus to be 54 ozs. per ton, consequently they could not afford to pay carriage, or to be reduced in other people's reduction works. As the directors pretended, in order to save themselves from the charge of mismanagement, to have forgotten the existence of these ores, and went so far as to request me to point them out to their agent, Capt. Paull, I got a letter from him confirming the statement of Capt. Grose, and sent the letter to the directors. If they thought they had been taken in by Dr. Chester, the owner of the mine, they should have called the shareholders together, and exposed him, and their credulity in the matter. The directors, however, know the value of Capula well enough, and its history; that Villar, a Spaniard, and former owner, made a fortune out of it; that he possessed the hacienda of San Pascual, at El Chico, and that he alone built the hacienda of Plan Grande, in order to be able to reduce the large quantities of metals which he expected to extract by means of the adit which he drove, of more than 500 varas, to cut the Capula vein in depth. These facts are well known out here to everybody, and that nothing that was promised in the prospectus has been carried out is equally clear. The driving of the adit level on the course of the vein has caused the discovery of a fine bunch of ore, both above and below the adit, which produces metals of an average of 25 marcs per monton. The last lot of ore, just beneficiated at San Cayetano has given 31 marcs per monton, which is very rich ore for Mexico. About 100 cargas of this rich ore are being extracted weekly, which, if mixed with 200 cargas of the low-ley ores, would give an average of 15 marcs per monton, and it would equal in quality the metal of the great bonanza of the Rosario Mine of the Real del Monte Company.

Some $2000 were expended in blasting for a foundation for the reduction works, in a period of six years. The directors have called up the capital in driblets, and sent out a few hundreds now and then. In 1868 the remittances were spent in making a road to carry the engine from Real del Monte to Capula; in the erection of the house and engine, and keeping up the working of it; in sinking the shaft in hard ground at $200 per vara, and driving the adits levels east and west. All these expensive and dead works could not be defrayed by 100 cargas even of rich ores, since these have suffered numerous reductions on their profits:—

1.—Freight to different reduction works.
2.—Cost of reduction at $30 to $35 per monton, instead of at $20 to $22 in the company's own works.
3.—The increased price of the materials used, instead of the market price, if purchased by the company.
4.—A greater loss on the reduction of the metal, amounting to 30 per cent. of the silver at times.
5.—The loss of the residues, or tailings, which would be worked over again in the company's own works.
6.—The continual stoppages, for want of reduction works, and that it was no use extracting continually when reduction could not be obtained for the metal.

I have pointed out the inversion of the funds that were sent out, and it will be clearly understood that Capt. Paull could not erect reduction works, valued at 15,000*l.* in the prospectus, when he has had difficulty to keep the mine working even. The directors state that they have continually and urgently ordered Capt. Paull to build the reduction works, but he could not do so without ample funds. The balances of his cash show that the company have generally been in debt to himself and the English miners, so that when funds have come they were devoted to the settlement of back accounts and debts.

So far from the London expenses being 250*l.* a-year, I believe that they have been double, and more than double, that sum, and every call has therefore, suffered a considerable diminution before reaching Mexico, because tha directors' fees must be taken also into consideration, and their generous and gratuitous offer of services has been long forgotten by them. How many years have the company been working? Let the shareholders enquire how near 4000*l.* the London expenses amount to.

The engine arrived at Vera Cruz near the end of the rainy season, and orders were sent out by the directors, who are supposed to know all about Mexico, to forward it at once to the mine. The engine cost in England, I believe, about 600*l.* The freight and charges from Vera Cruz to Pachuca alone cost $8692 (say, 1338*l.*) Had the engine remained about a month more at Vera Cruz the freight would have been "one third less," or $1 per arroba instead of $3, yet Mr. Phillips, the Chairman, had been in Mexico, and should have known better. I wrote the directors, urgently asking them to procure the funds for building the reduction works, and pointed out clearly the necessity for them, and the losses the company was sustaining, as stated in the points Nos. 1 to 6, already mentioned. My letter reached England when the shares were at a premium. In answer, the directors ridiculed my assertion as to the losses in reduction, and called them "alleged differences;" that the contract "did not compel the company to erect a hacienda;" that such a cause would have caused "an augmentation of the debt." "They cannot think that that would have been good policy, and they have shown that they have the power of doing what they have done under the contract. Having, then, this power, besides the general management of the concern, the directors cannot admit your objection to the charge of freight on the ores reduced at other haciendas, and the alleged difference of cost of maquila."

They conclude with a *non possimus* worthy of a certain obstinate individual. "The directors do not think it expedient to issue the 5000 remaining shares of the company, and they have no power of appropriating any part of the capital in the way you suggest." They showed their determination forthwith not to follow my advice, by ordering the quotation of the company's shares in the *Mining Journal* to be reduced to 20,000, instead of the 25,000 at which they had always stood. Their urgent desire, and orders to the agent here, to build the hacienda were not real and effective as they wish one to believe, and the agent could not make them effective, because he had no authority to draw, and Messrs. Lascarain and Co., the agents of the company, were not the people to allow such a liberty to Capt. Paull, as they have now refused to advance anything, although he has three bars of silver in Pachuca, and he has been obliged to borrow funds for the week's wages from a relative, named Scoble. Under such a wretched state of things how can the concern pay its expenses, much less leave profits? The directors throw the blame on Capt. Paull, and have allowed the shareholders to suppose that they were disappointed in the quantity of metal in the mine, through mistatements of the owner, Dr. Chester. It is necessary to throw a light on all these matters, in order that the shareholders may form their own judgment on them, and to remind them that the directors in the prospectus distinctly stated that "before any result can be obtained, it will be necessary to erect reduction works." Let the shareholders ask Brazilian and other foreign mining companies whether the Don Pedro Company would leave profits if they did not reduce their own ores. The San Pedro del Monte, a comparatively new company, with a new mine, have spent $30,000 in erecting a small hacienda, and they have certainly gone the right way to work.

After several months the directors of the Capula Company find out that ore has been discovered, and that their success mainly depends upon the possession of one or more haciendas of their own, and issue a pamphlet explaining the advantages to be derived by the erection of them, and found their reasons upon the very same facts to which I had so seriously drawn their attention, but which they had ridiculed as "alleged differences." I had also requested the issue of the same 5000 shares (at a time when the shares were at a premium) which the directors now urge the shareholders to take up, in order to save the property: my proposal would not have altered the position of the shareholders, as all would have been on the same footing; but the directors, having placed themselves in an awkward predicament, as they waited till they had called up their last 2*s.* 6*d.*, are now obliged to offer special inducements, in the shape of preference shares and a preferential 10 per cent. interest per annum. Of course, the small and poor shareholders are knocked into a cocked hat, and will be in as bad a position as if the property were transferred to another company, as they will have to wait till the preference shareholders are paid capital and interest. If my advice had been followed many shareholders would not have suffered an injustice, for which they have to thank the directors. In turn, I may ask, did the directors sell out shares when they were last at a premium, as they state their willingness to take their portion of preference shares now? Why should the directors distinctly refuse to issue unallotted shares when the shares are quoted at a premium, and then wait for several months to issue preference shares, of which, as rich people, they can get the lion's share, especially as the shareholders are tired out with promises? I leave it to the shareholders to make the enquiry. They will do well, also, to have the secretary's letter of Oct. 31 read, in which the directors deny their obligation to build an hacienda, and refuse to provide the funds, or to have their general power of entire management interfered with. On March 23 the directors say they "trust that the explanations they have given will be sufficient to satisfy shareholders that the success of the concern absolutely depends upon the prompt possession of adequate hacienda power at or near the mine." Let the directors explain their decided and absolute contradictions respecting the hacienda and the issue of the shares between Oct. 31 and March 22. The shareholders will see that, so far from the owner being in any way responsible for the ill-success of Capula, his interest has suffered, and his advice has been repudiated, and they would do well to have him named local and consulting director, to whom the manager may apply in difficulties. I think I have explained sufficiently the causes of the failure of the Capula Company to date.

I suggest to the shareholders of the El Chico Company to arrange and accept (say) 2500 preferential shares fully paid-up of 2*l.* each, of the 5000 which the Capula proposes issuing, in payment of the hacienda of San Pascual. Both companies may then with confidence expect dividends before long by this union, which was required long since, and had better be effected, as the last chance for both parties. Should the El Chico Company's mines ever produce metals, arrangements could be made to beneficiate them at San Pascual at the cost price. This arrangement will prevent the inevitable winding-up of the El Chico Company, and the Capula Company would have only 2500 shares to dispose of amongst its shareholders, and the El Chico should then be allowed, if desired, a proportion of the remaining preferential shares. Let the shareholders of both companies look to their own interests, and not deposit absolute power in the directors for the future.

JOHN P. SEWELL,
Real del Monte, Mexico. Interventor of the Capula Silver Mining Co.

P.S.—If the Capula Company do not arrange, as suggested, with the El Chico Company, the result will be that although great advantages are promised in the shape of preferential interest, &c., as the calls are to be divided over a long period, they will not serve the purpose of building a hacienda, as the funds are required at once, and in a lump sum, to be of any use. If the funds are to come to Mexico, as heretofore, in driblets, after the London expenses have made their inroads into them, the object will not be secured. At least half the amount of the preferential shares should be paid at once, or how are then entitled also to a preferential 10 per cent. interest, or when does such interest commence? How much of the preferential capital will be consumed by the preferential interest? The shareholders of the Capula Company will do well to call a meeting, and appoint a committee to have the correspondence between the secretary and myself read, in order to verify my statements, and to arrange with the El Chico Company, who should also appoint a committee to inform themselves of the opinions held of their property by Mr. Hampshire, who has been lately in charge, and what he will write shortly. Unless these measures are taken by the shareholders the companies will be sacrificed to the present enmities of the directors—of Mr. Van Weede on one side, and Mr. C. Rule on the other, who will oppose amalgamation rather than resign their directorship for the benefit of their respective companies. J. P. S.

[For various reasons the publication of this letter was deferred until the writer could be communicated with. The delay has not necessitated any material alterations, but a few omissions may allay some ill-feeling.]

[For remainder of Original Correspondence, see this day's Journal.]

LITERARY NOTICE.

Life of James Ferguson, F.R.S.: a brief Autobiographical Account and further extended Memoir, with numerous Notes and illustrative Engravings. By EBENEZER HENDERSON, LL.D. Second edition, with additions. 8vo.—Edinburgh and London: Fullarton.

In our notice of the first addition of this excellent and exhaustive memoir of the singular, self-taught genius, Ferguson the astronomer, we gave a general outline of the character of the present work, which has deservedly arrived at a second edition. It shows strong determination of purpose in a biographer who, through forty years, steadily keeps in view one object, industriously seeking out and storing for future use every minute detail requisite to complete his object. The materials thus accumulated by Dr. Henderson lay scattered in every possible direction, but as now brought together and judiciously arranged they give vitality and interest to the otherwise meagre autobiographical document left to posterity by the philosopher himself. The "Addenda," consisting of only twenty pages, comprises above a dozen articles of material interest in reference to the subject of this Memoir; and we heartily congratulate the author on the successful issue of his long-continued research.

SCOTCH SILVER MINES.—It is stated that the ancient silver mines on the Bathgate Hills, which are situated about three miles from the town of Bathgate, have been leased by Mr. Henry Aitken, coalmaster, Falkirk, from the Earl of Hopetoun. These mines were worked for many years by King James VI. of Scotland, but owing to a want of proper machinery at that period, the yield did not pay the working. The King, it is stated, brought a great number of skilled workmen from Germany, who explored the hills, wrought the ore, and extracted from it silver and lead, the latter, however, being greatest in quantity. Several small nuggets of gold have also been found on different occasions. Silver pieces, coined from the produce of the mines during the period when Linlithgow was the residence of royalty, are still extant. The place where the metal was formerly smelted is to this day called Silver Mill, and the farm on which the quarries or mines exist is called the Silver Mine. For many years the vein was lost, but about six or seven years ago a number of gentlemen belonging to Bathgate subscribed money and recommenced operations. They found out part of the lost workings, and also came upon a new vein of silver, which runs downwards through limestone rock. The quantity of ore extracted on that occasion was worth about 30*l.*; but the whole of it was taken away in the shape of specimens and mantle-piece ornaments by geologists and others. The gentlemen referred to were advised to trace this vein until it went through the limestone rock; but, in consequence of pecuniary difficulties, the workings were abandoned. It is believed, however, that through the energy of Mr. Aitken the subject will now be thoroughly investigated, and the value of the mines properly ascertained.

ROTARY ENGINES.—According to the invention of Mr. LOADER, of Worship-square, a central shaft or axis having a crank pin or eccentric formed on or carried thereby is passed through a cylinder, and on such crank pin or eccentric is mounted a disc or piston, which is carried round thereby with its periphery in contact with the inner periphery of the cylinder, as has heretofore been proposed, but instead of allowing the disc or piston to completely revolve upon its axis, it is only allowed slightly to rock to and fro thereon by connecting the stop or abutment to such disc or piston by means of a cylindrical joint, which may be connected to the stop or abutment, in which case the stop or abutment may be rigidly fixed in the cylinder, and may pass through the two parts of a cylindrical joint, working in a correspondingly formed recess within the disc or piston, a suitable space being formed within the disc or piston to receive the stop or abutment as the disc or piston is carried round by the crank pin or eccentric on which it is mounted, the two parts of the cylindrical joint being forced together in any suitable manner so as to make a tight joint at those parts.

FOREIGN MINING AND METALLURGY.

The state of the Belgian coal trade remains as favourable as could be wished for all descriptions, and especially for industrial qualities. The establishments producing briquettes are in full activity, and the same may be said of the coke-furnaces, coke being much sought after, and the whole production being engaged beforehand for a considerable time. Orders continue to flow in for all descriptions, with the exception of coal for domestic purposes, in regard to which there is some falling off. This would naturally be the case, having regard to the period of the year at which we have now arrived. Even in domestic descriptions the falling off in business is less marked than it has been in some previous years. The Belgian iron trade continues in a prosperous condition. Rails, plates, merchants' iron, and iron for building purposes, are all in demand, especially rails and plates, in such proportions that the production is now engaged beforehand until the commencement of 1871. The quotation for rails is 7*l.* 4s. per ton; that of merchants' iron, 6*l.* 16s. per ton; that of casting pig, 3*l.* 16s. per ton for No. 5, with a scale of 2s. per number. Plates for construction purposes have brought 10*l.* per ton, with a very decided tendency upwards. In connection with the tenders invited in Belgium for 7000 tons of Bessemer cast-steel rails for railways in Victoria (Australia), it appears that deliveries are to be made at London, Liverpool, Bristol, or one other port at the choice of the manufacturer. Deliveries are to be made by the close of November. It seems very doubtful whether Belgium can fulfil these and other conditions.

The net profits realised by the Carmaux Mines Company amounted last year to 28,402*l.*, and after providing for the obligation service and making a statutory appropriation to the reserve, there remained a balance of 20,148*l.*, out of which a dividend was declared at the rate of 17s. 6d. per share. Of this dividend 8s. per share was distributed in November, 1869, and the balance of 9s. 6d. per share has been in course of payment this month. The French General Algerian Company contemplates certain mining operations in Algeria, but has not yet actively commenced them. A company for industrial operations generally, and mining in particular, has just been formed at St. Petersburg. The company has principally for its object the development of metallurgical industry in Russia, and the making rails and all descriptions of railway plant. Efforts will also be made to extend mining industry in Russia, which has hitherto been much neglected. The share capital of the company has been fixed at 2,500,000 roubles, in 25,000 shares. The company has every possible encouragement from the Government, which is extremely anxious to encourage the production in Russia of railway *materiel*.

The activity previously reported as prevailing in the coal mines of the Nord and the Pas-de-Calais is not only sustained, but is increasing from day to day. The extraction is being carried to as considerable an extent as possible; unfortunately, labour makes default. All kinds of coal are taken off as fast as they are made available for sale. The production of coke is being actively developed; the presses of the Anzin Company for the production of agglomerates are in full operation, and their make is disposed of readily. Upon the whole, it may be stated that the advance recently noticed in French coal is firmly sustained. Coalowners hope to do more business than they have transacted hitherto at Rouen and Amiens, as a rise in freights may check arrivals of English coal in those towns. The French iron trade has been generally quiet; the plebiscite has caused orders to fall off, but it is hoped that they will now regain a regular current. In the Champagne district iron is sustained very well at preceding rates, and work is abundant; the foundries are also working tolerably actively. There is not much that is novel to report from the Moselle district. White coke-made pig for refining is quoted at 2*l.* 17s. 6d. to 2*l.* 18s. 4d. per ton; speckled ditto, 3*l.* 0s. 10d. to 3*l.* 2s. 6d.; grey ditto, 2*l.* 18s. 4d. to 2*l.* 19s. 2d.; casting pig, No. 1, 4*l.* to 4*l.* 4s.; ditto, No. 2, 3*l.* 16s. to 4*l.*; ditto, No. 3, 3*l.* 12s. to 3*l.* 16s.; ditto, No. 4, 3*l.* 8s. to 3*l.* 12s.; ditto, No. 5, 3*l.* 4s. to 3*l.* 8s.; refining pig, charcoal-made, 5*l.* 4s. to 5*l.* 8s.; rolled coke-made iron has brought 8*l.* 4s. per ton. It was stated recently that MM. Philippe and Bradfer were making axles at their works at Stenay, in the Meuse, but it appears that this is not the case, as the firm is devoting its attention to tyres. Long debates continue to prevail among the French industrials as to the working of the warrant system; at present, however, these debates have not been attended with any definite result. The Khedive of Egypt has just ordered from the Compagnie des Forges et Chantiers de la Méditerranée two first-class iron lighthouses. The first will be placed at Sonakin; it will be 180 ft. in height, and will be furnished with a revolving light, visible at a distance of 30 miles. The second will be erected at Ras-Garib; it will be 150 ft. in height, and will have a fixed apparatus of the first class. The Société des Forges et Chantiers de la Méditerranée has been paying this month the balance of its dividend for 1869, or 2*l.* 16s. per share. The Maubeuge Blast-Furnaces Company was to commence yesterday (Friday) the payment of its dividend for 1869. The Bethune Mines Company commenced the payment, on Monday, of its second dividend coupon for 1869, or 10s. per share.

The continental metal markets have been generally quiet, and prices have either been feeble or have displayed a downward tendency. In zinc and lead there has been scarcely any business doing. The present dulness is attributed to political circumstances, and a revival in affairs is anticipated shortly. A sale of 5000 piculs of Billiton is announced to take place shortly at Batavia; it is also announced that from June to April, 1871, each sale on this market will comprise 6000 piculs.

MINING IN AUSTRALASIA—MONTHLY SUMMARY.

NEW SOUTH WALES, March 26.—The Australian Diamond Mining Company continues its operations with success; the yield during the four weeks since the departure of the mail has been 225 diamonds, weighing 43¾ carats. Operations were temporarily suspended owing to the heavy rains. A lead and silver mine has been discovered at Goba Creek, 10 miles from Burrowa. A rich quartz reef has been discovered to the east of Teesdnctalso. Gold receipts by escort from the west, south, and north fields during January and February 24,027 ozs., against 35,222 ozs. in 1869. The Assembly has passed a resolution in favour of the appointment of a commission to enquire into the working of the gold fields law, and the state of the gold fields. This is a step that has long been needed to be taken, and is regarded by those interested in mining matters as of great importance.

ADELAIDE, March 29.—The Moonta Mining Company, half-yearly report states that during that period the yield of ore has been 10,436 tons, and the net profit 24,823*l.* The total number of persons employed by the company is 1080. The gold news of the month is unimportant. A company has been formed to work a reef in near proximity to which a promising discovery of copper ore has been made. Quicksilver has been found near Mount Lofty.

AUSTRALIAN MINES.

YUDANAMUTANA (Copper).—The directors have advices from their superintendent, dated Adelaide, March 24: With the fluctuating percentage of our ores, the only guide to cost per ton of metal is to take the mine cost of raising for the month, the ore smelted, and the smelting cost, as against the copper made; which is worth, at Port Adelaide, 58*l.*; or at the mine, 53*l.* A reference to the two cost-sheets sent by this mail will show that the mine and smelting cost was about 1150*l.* we consumed 1200 tons of wood, at 11s.=650*l.*; and we made 37½ tons of metal, at 53*l.* The cost, therefore, per ton of metal this month was 48*l.* Next month, if richer ore is raised, the cost will necessarily be less. I leave to-morrow morning for the mine, taking with me Mr. Thomas, with whom I think of making a permanent agreement, as the changes now constantly taking place at Blinman necessitate the presence on the spot of a scientific man.—The following telegram from Mr. Fiveash, at Blinman, to the local secretary, accompanied his advice:—March 30, 1870: Cut the lode at 50 fms.; lode 2 feet wide; solid yellow ore. We sunk upon it 3 fms. 6 ft. on the north and south sides of the lode; good ore ground; neither a hanging wall or foot wall yet. Other parts of the mine are looking well: the sulphurets establish the permanency of the mine. I do not like to say much for fear of causing excitement. We had two hours heavy rain last Saturday. The creeks were flooded. We now want wood carters badly.—Capt. Terrell, under date March 19, reports: Blinman Mine, No. 1 Winze: About a fortnight ago I put the men who were stoping to sink on the lode at our deepest level—about 46 fms.; at first the lode was composed of carbonate and red oxide, very rich; we sank about 6 ft., when the ground changed, and the ore turned to yellow sulphurets, about 28 per cent. It kept like this for about 2 ft., when it again changed to black ore and yellow ore coated black, of about 35 per cent. The lode is about 2 ft. wide of this sort, but there is good orey ground for about 20 feet in width, the ground is much softer, and it is my opinion that a few fathom deeper we shall cut water—the ground and the nature of the ore have every appearance of it. The lode improves every foot we sink. I am sure you will be pleased to hear this, and as we are now down to the sulphurets there is not much fear but that the mine will be very productive.—No. 2 Winze: The lode in this place is looking very poor; it is composed chiefly of iron, very little ore.—No. 3 Winze: The lode is looking just the same as when I wrote last. The stope south of No. 1 winze is looking very well; the lode is about 18 in. wide, of ore about 30 per cent. These are all the places which are at work at present.

ENGLISH AND AUSTRALIAN (Copper).—The directors have advices from their manager, dated Port Adelaide, March 30. The quantity of coal at Port Adelaide and afloat was about 783 tons. There were three furnaces at work at Port Adelaide, the refinery was out for repairs, but would be at work again in a few days. There were about 165 tons copper ready for shipment.

PORT PHILLIP AND COLONIAL (Gold).—The directors have advices from their resident director, Mr. Bland, at Clunes, March 23: The quantity of quartz crushed during the four weeks ending 2nd March, was 3890 tons; pyrites treated 44 tons. Total gold obtained 885 ozs. 13 dwts., or an average per ton of 4 dwts. 13 grs. The receipts were 3350*l.* 13s. 8d. Payments (including 1162*l.* 6s. 3d. paid on account of firewood and timber), 4705*l.* 7s. Loss, 1354*l.* 13s. 4d., which added to the debit balance of last month (2418*l.* 16s. 7d.), makes a total of 3773*l.* 9s. 11d. to the debit of the joint account. The return for the two weeks ending March 16 is as follow:—Quartz crushed, 1962 tons; gold obtained, 344 ozs. 5 dwts., or an average per ton of 3 dwts. 12 grs. In reference to the telegram received, it is advised that a sample of 55 tons of quartz taken from a winze sunk 73 feet on the Old Men vein at the 517 feet level yielded an average of 1 oz. 5 dwts. per ton.

AUSTRALIAN UNITED (Gold).—The directors have advices from Mr. Kitto, dated Fryerstown, March 28. Mr. Kitto writes:—"At the Central Mine everything is progressing most satisfactorily, and in a very short time the washing machinery will be completed. I have hired an engine for winding purposes." The agent, Capt. J. H. Holman, reports on the Central Mine to Mr. Kitto, March 26, as follows:—"The shaft is now down 247 ft. 6 in., or 25 ft. 6 in. into the bed rock, which is slate. As you desire, I think it advisable to sink about 7 ft. more before opening out, so as to allow us a 5-ft. well, and room for plat, &c. We can at any time reach the wash drift if required, and trust before another mail has left for England not only to have reached the required depth, but to have the plat cut and driving going on. There is not now one shadow of a doubt as to the paying qualities of the wash dirt, as the prospects obtained from the bottom will show. The only difficulty we have now to contend with is not being able to make the pump buckets stand any length of time; but this will be remedied so soon as a plunger lift can be fixed, which can all be done in the course of a short time." On the Duke of Cornwall Mine Mr. Kitto writes:—"With a view to be fully satisfied as to the value of the quartz above the flookan in the Duke of Cornwall Mine, I have unfortunately (the ground towards the south being very bare, and very little quartz obtainable there) caused most of the stuff during the past month to be obtained from the former place, and the result is just as before—735 tons gave only 55 ozs. of gold, or about 1½ dwt. per ton. The result of crushing poor stone is further illustrated by the treatment of the pyrites, 34 tons giving only 18 ozs. of gold. At present there is only one drive and one stope (very hard), barely payable, so I have resumed the sinking of the shaft, in order to strike the lode in a more settled country. My belief in the value of this property is as strong, if not stronger, than it ever was. The Rowe's, close to this, obtained 200 ozs. from less than 30 tons last week, and I am obtaining over 1 oz. per ton from a large reef in the Road claim. In the Duke of Cornwall we must sink deeper." The following is the report of the agent (Capt. Williams) to Mr. Kitto, March 28:—"Duke of Cornwall Mine: I beg to hand you a report of this mine for the past month.—Daukes' Shaft, 200 ft. level, North Drive: Since my last we have driven 40 ft.; the lode in the present end is not looking quite so well as it has been, although it has improved since last report. I think there will be a change again very soon.—South Mine: We have driven 11 ft., and about 12 ft. on the western leaders. I shall recommend driving on these leaders for awhile. I beg to state that the south drive men were stoping at commencement of the month.—South Stopes: Looking much the same as during last month.—The High, or Top Stopes: I would recommend these to be stopped, the quartz being very poor above the intersection of the flookan. During the past month we have raised up to the 133 feet level on the eastern flookan, and I am quite convinced that the upper ground is valueless. (See the result of our last crushing, a large proportion of the quartz coming from the rise through to the 133 ft. level.)—North Stope: This stope is improved a little since my last report.—Remarks: I would recommend driving the eastern cross-cut a little further, as I think we should get into some quartz very soon, there being several branches of the lode dipping to the east, about 30 or 40 feet above the back of the level; in fact, they are more or less from the back of the level to the high stopes, and there is a small flookan carrying a leader of quartz about 8 or 10 in. wide underlying west to the 133 ft. level, about 25 ft. east of the main flookan. I would also recommend sinking. The surface works are going on as usual."

ANGLO-AUSTRALIAN (Gold).—Mr. Kitto, under date March 28, sends the following report from Capt. Joseph Raisbeck, the agent:—"Since my last report we have finished cutting the foundations for engine-house, &c., and are now ready for the masons. We are still quarrying stone for the building, and have a large quantity ready on the ground. The carpenter's shop is in course of construction. I have to inform you that the contractors for No. 1 shaft have stopped working on account of excess of water, in accordance with the terms of their contract. The total depth of the shaft is 85 ft., all timbered and secured, excepting one division, which will be deducted from their payment. To the east of No. 1 shaft is a channel of slate ground, full of shallow spurs and leaders; the worked portions of which in early days yielded large returns. Having been only superficially mined there still exists a large amount of solid ground, which will be available so soon as the batteries are erected. I have commenced to sink two smaller shafts here preparatory to opening on a large scale. I am also continuing the cross-cut in No. 3 shaft, originally sunk by Messrs. Kitto and Lamb for the purpose of cutting the eastern lode. There are small leaders in the present end, which is 53 ft. from shaft."

YORKE PENINSULAR.—The directors have received advices from the committee of inspection at Adelaide, dated March 30 last, with reports from the Kurilla Mine to the 28th of that month.—Captain Anthony reports: The total depth of Hall's shaft is now 43 fms. 4 ft. 3 in. . . . . The lode in the cross-cut, 25 fms. east of this shaft, is 4 ft. wide, composed of quartz, mundic, and black ore. It is now driven on south and west a distance of 5 fms., and it continues to improve in size and quality, but the ground is so hard as to induce me to suspend driving until the lode west of Deeble's is further developed, and the expense will not be so much felt as now. Having holed the rise from the back of the 25, west of Hall's to Deeble's shaft, the place will in future be reported as the 25 fm. level, west of Deeble's; at present I have nothing new to speak of; I shall resume driving here as soon as the shaft is timbered. Deeble's shaft is now 25 fms. deep, and will be available for drawing from that level in a few days from date, when the 15 and 25 levels will be driven west each, by six men, and each into good ore ground. The aggregate yield of the two levels will be about 15 tons of ore per fathom, which will net 7*l.* per ton, or 105*l.* per fathom, and the price for driving will be about 20*l.* (10*l.* each), or (say) 5 per cent. of the yield. It affords me great pleasure to give such a favourable report, and should the ore hold good going west the property will become highly valuable. There have been 50 tons of ore sold during the month.—The committee write as follows: You will see that Deeble's shaft is fairly holed through, meeting the 25 fm. level, west from Hall's; and Capt. Anthony expects to begin raising ore again almost immediately, a work which has necessarily been suspended while the shaft was being sunk. . . . . Hall's shaft will shortly be down to the required depth. Some improvement is already shown, as you will see by the box of ore sent you per Hugh Fortescue, taken from the bottom a little below 43 fathoms.

SCOTTISH AUSTRALIAN.—The directors have advices from Sydney, dated March 25, with reports from Lambton Colliery to the 22nd of that month. The sales of coal for the month of February amounted to 11,407 tons.

FOREIGN MINES.

ST. JOHN DEL REY.—The directors have the following report, dated Morro Velho, April 16:—Morro Velho produce for March, 7545 oits.; from 3884 tons ore; yield 1·942 oits. per ton; cost, 4025*l.*; loss, 1135*l.* Morro Velho produce eight days of April, 1428 oits.; yield, 1·545 oits. per ton. Gaia produce for March, 426 oits. from 430 tons ore; yield, ·991 oits. per ton; cost, 387*l.*: loss, 207*l.* —New Shafts: Entire outlay for March, 1322*l.*; remittance received, 15,364 oits. =147·602 lb. troy.

DON PEDRO.—Mr. F. S. Symons reports for March: Produce, 6103 oits., at 8s. 6d. per oitava, 2593*l.*; cost, 3222*l.*: loss, 629*l.* The sum of 877*l.* has been paid for timber, poles, &c., and written off in cost. Operations have been carried on with regularity, but not with the usual good results. The reserves and new discoveries in Alice's west have yielded poor general and no box-work. A little box-work has been taken from canoa in underlie lode (the deepest part of the mine worked on), which maintains its auriferous properties, as proof of which, in latter part of month, five boxes of work from a small line gave about 500 oits. of gold; water will soon disable us from working this section until drained. Where 20 tons per day were broken from this part of mine when lode was high and dry we cannot now break one, and even this with difficulty. Efforts must be directed to the efficient draining of mine. Water is increasing in sinking Vivian's shaft, and the work at horse-engine becoming too heavy for the animals, it is under consideration, therefore, to work it with a water-wheel, which will enable us to drive at greater speed, give a longer stroke, and free us from the numerous stoppages attendant on the use of the animals. This we hope will enable us to sink and drain several fathoms of good lode in curve (so long in abeyance) and canoa in underlie lode.—First Division of April—Extract from Mr. F. S. Symons' letter, dated April 17: "Produce, weighed to date, 2124 oitavas. Little alteration in the mine since my last. From stopes opening out on the reserve underlie lode, promising samples are being taken; the quantity quarried from this section will increase. From the canoa in the underlie lode we have been getting some good lode, but have now worked it down to where the water is becoming very troublesome; we shall shortly be obliged to relinquish these stopes for a time until enabled to drain them. This lode maintains its good size and auriferous quality, and could we quarry now as much as formerly our produce would be a very different figure. [With reference to the Don Pedro Gold Mining Company, it is officially notified that "as the profit for the first quarter of 1870 would admit of only a very small dividend, the directors have decided to include the amount with the dividend for the second quarter.]

ANGLO-BRAZILIAN.—Mr. F. S. Symons reports for March: Produce, 3562 oits., at 9s., 1602*l.*; cost, 1545*l.*; profit, 57*l.*—General Remarks: Produce exceeds that for February by 337 oits., and the standard of ore shows a trifling improvement; attendance has been fair, and the works have been carried on with regularity.—Mine: The lode at Dawson's has improved in size and yield, but that from Foster's west, embracing part of the Fundao, has not given so well, it having become squeezed with more killas. The stope to drain the Fundao workings deeper is being pushed on. The lode at Haymen's has opened to satisfactory dimensions, but as yet its standard is low.—First Division of April—Extract from letter dated April 17: General operations both in and out of the mine have proceeded with the usual regularity, and nothing new to advise.

ROSSA GRANDE.—Ernest Hilcke reports for March: The gold return for March amounts to 2611 oits. Total cost for the month, 1271*l.* The general features of the lode in Mina de Serra are not looking so favourable as when last reported on. At all points of progress, with the exception of the shaft, where the lode maintains its good appearance, we experienced during the latter part of the month a considerable decrease in the size of the lode. Still it gives me great pleasure to state that the general body of the lode has yielded splendidly, and averaged 18 oits. per ton, or an increase of 3·26 oits. per ton of previous month. In the Cachoeira Mine the large lode intersected by the adit has undergone a trial. The ore extracted was taken from its whole width; 27 tons have been treated, and only yielded 20 oits. of gold, or 0·74 per ton. This lode proving thus very poor, operations on it have been suspended. However, it would be advisable, whenever the force permits, to give it another trial by extracting the more productive parts only.—First Division of April—Extract from letter dated April: No improvement is visible since my last in the features of the lode in Mina de Serra; on the contrary, its size is more contracted. That in the shaft continues to look well, and it is pleasing to observe that the auriferous quality of the stone throughout the mine maintains its rich nature.

GENERAL BRAZILIAN.—Capt. T. Treloar reports for March: Our operations generally have proceeded satisfactorily, and promising samples of gold have been taken in new ground.

TAQUARIL (Gold).—Mr. T. S. Treloar reports for March: The sanitary state of the establishment has been favourable; weather fine; force adequate to our requirements; and amount of work accomplished highly satisfactory. The erection of the pumping machinery is progressing with such speed that I may safely say the whole will be in good working order by end of next month. Operations in cross-cut to old working have been placed under suspension. Finding the old shaft full of crushed matter, timber, pumps, &c., it has been deemed expedient to make no attempt to reach bottom of same, until the pumping engine is put to work. A level at a deeper horizon will then be driven. Timber has come in plentifully, and prices of provisions have been more moderate than in February. Of the former we have now a good stock on the establishment.—First Division of April—Extract from Mr. T. S. Treloar's letter, dated April 15: The Easter holidays are militating against the attendance of force, and some of our works in consequence are nearly at a standstill. We have however, sufficient hands to enable us to prosecute erection of pumping machinery, the whole of which will be ready by end of current month. In the mine there is little or no change calling for special comment. Water has been met with in cross-cut northward from engine-shaft, but to date we have not reached the lode.

FRONTINO AND BOLIVIA.—The directors have received the following telegram, purporting to come from Mr. Greiff, dated Mobile, May 14, the accuracy of which they do not vouch for:—"On April 10 came on branch of quartz, which shows to yield enormously. I should say five per cent. of gold. Full particulars by mail."

ANGLO-ARGENTINE.—Capt. Vivian reports for March: The main lode intersected in the cross-cut driven in the base of the hill is driven into 21 ft.; the footwall is not yet reached; the lode never looked better than at the present time; it is a very fine looking lode, of great promise. Good progress has been made in building the houses, yard, &c., for the Government, which will be completed at the time agreed on,—namely, the 15th of May next. Engineers are making the necessary arrangements for putting the boilers together for the stamping engine. All our other work going on satisfactorily. The first troop of carts, 40 in number, with about one-third of the machinery, arrived here on the 22nd day of this month; all well.

ECLIPSE (Gold).—Capt. Barratt, the managing agent and chief mining engineer of the company, under date April 18, reports from the mine as follows:—I beg to inform you of our arrival here on the 12th inst., since then I have been engaged taking out stores for the mine, getting deed recorded, procuring tents, &c. This day all hands go to the Eclipse, and a person residing at Independence, about 20 miles from here, who is appointed by the vendors to give me possession of the Eclipse Mine, will be on the ground to meet me, and by mid-day the Eclipse Gold Mining Company (Limited) will be in possession of their mining property. We shall at once commence to build houses, clear the mine, fix and clear site for stamps, and do other necessary work. Mining and all other preliminary work will now go on without any impediment. I enclose you the deed recorded or registered with other documents, which I hope will arrive safely at the office.

PONTGIBAUD.—W. H. Rickard, May 2: Roure: The 80 metre level, south of Richard's shaft, is in a lode 8 ft. wide, of low quality saving work. The 60 metre level south has much fallen off in value; it now yields ½ ton of ore per fathom. The 60 cross-cut east has entered more favourable ground, consequently our progress is greater. The winze below the 40 yields ½ ton of ore per fathom. The 20 metre level south, on Virginie's lode, yields ¼ ton of ore per fm. The same level north yields 1¼ ton per fathom. The adit north, on Virginie's lode, yields a little saving work. The same level south yields ¼ ton of good ore per fathom. In the stollen south we have driven the eastern cross-cut beyond the line of the lode, and suspended it. We now resume the driving of the level south on the most promising part of the lode, which is composed of flookan, with a vein of quartz spotted with mundic. Our tribute pitches yield pretty well.—La Grange: The 100 metre level, north of Nosky's shaft, yields ¼ ton of ore per fm. The 60 north yields a little saving work. The rise in back of the 20 north is poor. Our seven tribute pitches yield a little less ore than during the last few months.—Mioche: The adit north being unproductive, and in an unkindly rock, we have suspended it to cross-cut further east. The rise in the back of the adit yields a little saving work, opening a little tribute ground. We have set a second rise in this level, south of cross-cut, to open up the lode and to give air to the level. We intend driving from the top of No. 1 rise. There is no change in the adit cross-cut at Bonzarat.—La Brousse: The sinking of the engine-shaft continues to go on slowly. The 100 metre level north yields a small quantity of saving work. The same level south is in a strong lode, composed of quartz, spotted with ore, and producing a little low quality saving work. The 100, on the western part of the lode, is poor. The 80 south yields ⅛ ton per fm. The 40 north is in a large, regular lode, which is all the width of the level, but yields no ore to value. The 12 pitches do not yield quite so much ore as usual.—Pranal: The 50, north of cross-cut, yields 2½ tons of ore per fathom. The cross-cut in the 50 south will shortly cut the eastern vein, which is yielding 1 ton per fathom in the winze over the point of intersection. The 30 south yields ¾ ton of ore per fathom. The 30 north is unproductive. Our tribute pitches have improved a little. Our samplings have amounted to 261 tons.

EXCHEQUER.—Capt. Chalmers, April 18: During the week ending Saturday, the 16th inst., the air-shaft was enlarged 22 ft., and the winze was down 48 ft. There is a little ruby silver on the north side of the latter all the way down, which leads me to expect a large deposit soon after commencing to drift, which we shall do after sinking our sump from the 50.

CAPE COPPER.—The directors have despatches to March 25. No change of importance has taken place in any of the operations, except the mining work at Koperberg, at which mine very satisfactory progress has been made. Returns for February—Yield, Ookiep, 471 tons; Spectakel, 58 tons. Transport—Total for February, 343 tons. The Antonio Vinent was taking in a cargo of 640 tons. The Glanrafon has arrived at Swansea with 650 tons. The tramway staff were actively engaged in forming the line: 364 tons were sold on 10th inst. at Swansea, by public ticket, at an average of 13s. per unit.

ANGLO-ITALIAN.—Mr. Ferdinand Dietzsch reports for April: At Frisa and Asino the present appearance of the lodes is somewhat discouraging, but it is satisfactory to note that at Cavetta a good piece of ground is before us. Cortigio, likewise, appears to open out well. In the reduction of the ore, I am sorry to say, we experienced an unlooked for drawback. The stamps worked well up to April 13, when it was found part of the foundation wall was settling in such a way that it was evident that a continuation of working would render the machinery unsteady. This is to be ascribed to the circumstance that in building part of wall frosty weather early in November overtook us, which affected the binding effect of the cement. I decided at once on thoroughly repairing the defect by a more solid foundation of large blocks of stone, and I am pleased to say that this has been done speedily, and I think effectually, so that at present we can start again. The ore treated has been of a poor quality, and as it is bad for amalgamation, containing a large proportion of decomposed sulphides, some experiments will have to be made in that respect. Until this is done, I prefer high concentration and working as effected in several of the Brazilian mines. This operation is somewhat tedious when no practical hands are at command. Having also been pushed for time in carrying out the above mentioned repairs, I am not in a position to give the exact produce of gold, but estimate it at about 5 ozs.—[The directors have received important information in connection with the company, but owing to circumstances which they will explain at a future date they are compelled in the interest of the shareholders for the present to withhold the same.]

WEST CANADA.—F. Williams, April 16: Huron Copper Bay: Stephens's winze, sinking below the 35, west of Palmer's shaft, is worth from 2 to 2½ tons of ore per fathom; the lode is still very wide at this point. The stope in bottom of the 20, east of this winze, yields 3 tons of ore per fathom, and according to the present promising appearance of the lode it ought to yield that amount for some time to come. The stope below the 35, west of Palmer's, produces from 2 to 2½ tons of ore per fathom. The stope below the 20, west of Powell's winze, on the Fire lode, still yields 2 tons of ore per fathom. The stope over the 35, east of Bray's, produces 3 tons of ore per fathom. The stope below the 35, west of Bartle's winze, is worth 2½ tons per fathom. The stope over the 35, east of this shaft, and west of Carmichael's winze, still produces 2½ tons of ore per fathom. The 50, west of Palmer's shaft, yields 3 tons of ore per fathom; the lode in this end is as large as ever, but not quite as productive as when last reported on—however, it is still a very fine-looking lode, and if it continues it will be the making of this part of the mine. The lode in the 60, west of Palmer's shaft, is getting larger and more valuable as we proceed, and, no doubt, it will shortly be equally as productive as the lode in the 50; it yields 1¾ ton of ore per fathom. In the 60, east of Bray's shaft, the lode is again looking unkindly. The lode in Bartle's winze produces 2 tons of ore per fathom.—Wellington Mine: The stopes on the east and west of Rowe's shaft yield on an average 2½ tons of ore per fathom. Everything connected with the mine is going on well.

LUSITANIAN.—May 10: The lode at Taylor's engine-shaft, below the 130, is 8 ft. wide, and worth 2 tons of ore per fathom, for 15 ft. long. Rising No. 81, above the 28 fm. level, east of cross-cut, west of Peres' shaft, the lode is worth ½ ton of ore per fathom. Rising above the 130, against winze No. 80, east of Taylor's, on Basto's lode, the lode is worth 2 tons per fathom. In the 120, east of Taylor's, on Basto's, the lode is 2 feet wide, composed of country and quartz. In the 130 west the lode is worth 1¼ ton per fathom. In the 120 east the lode is worth 1 ton per fathom. In the 90 east the lode is worth ½ ton per fathom. In the 70 east the lode is 3 ft. wide, but nothing to value. In the 70 west the lode is 1 ft. wide, yielding stones of ore. In the 28, on the branch, the lode is 9 in. wide, composed of quartz and stones of ore. In the 28, east of cross-cut, the lode is worth 1 ton of ore per fathom. In the 18 east the lode is 1 foot wide, producing stones of ore.—Carvalhal: The lode in the end in the 50, east of incline shaft, begins to show a little more quartz and water, but nothing yet to value. In the 50 west the lode is 1¼ foot wide, composed of quartz. In the 40 east the lode is 3 ft. wide, and worth ½ ton of lead per fathom. In the 30 east the lode is worth ½ ton of lead per fathom. In the 20 east the lode is 1 ft. wide, composed of quartz. In the adit west, on the caunter lode, the lode is worth 2 tons per fathom. In the 10 west the lode is worth ½ ton per fathom.

NEW WILDBERG.—J. Sanders, May 13: East Mine: The drivage east at the Erbstollen remains as last week, worth 1 ton of ore per lachter; and the stope above the level, which is set on tribute, is worth 1½ ton of ore per lachter. Conder's drivage, in the 70, is not showing so much copper ore as it has for some time past, but the ground is of the same character as it was formerly.—Carter's Shaft: The stope in the forebreast of the 70, in Erbteilstergang Erzkammer, is yielding 1 ton, and the stope above the level 1¼ ton of ore per cubic lachter. The part of the stope now working above the 60, towards Johanne's sink, is worth 2 tons of ore per cubic lachter. The different pitches on and near the Dornergang Erzkammer are yielding on an average 1 ton of ore per lachter.—Beck's Workings: No more lode has been met with in the cross-cut north in the 70 as yet, and the tribute pitches remain as last week.—East Blumergang: The stopes above the 70, and between the 70 and 60, are each yielding 2 tons per lachter. The drivage west in the 60 is yielding some dradge ore for the dressing-floors, which will make about ⅛ ton per lachter.—West Blumergang: The 60 drivage east is worth 2¼ tons of ore per lachter, with every appearance of further improving; the ground is very hard and slow of progress.

[For remainder of Foreign Mines see to-day's Journal.]

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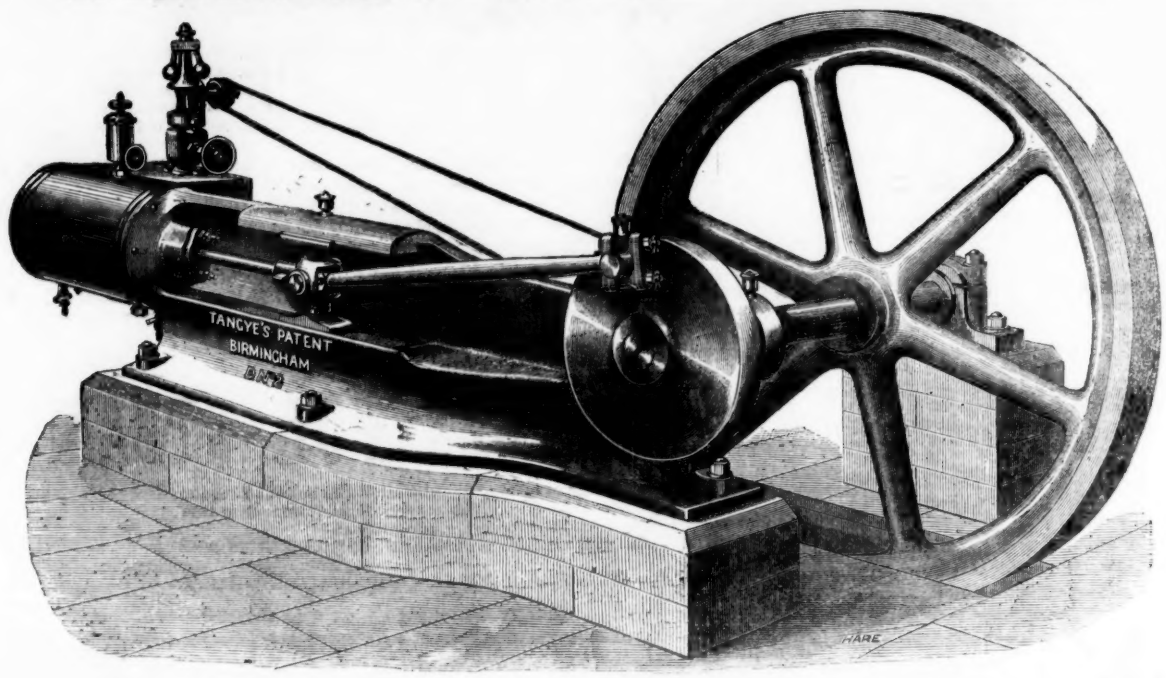

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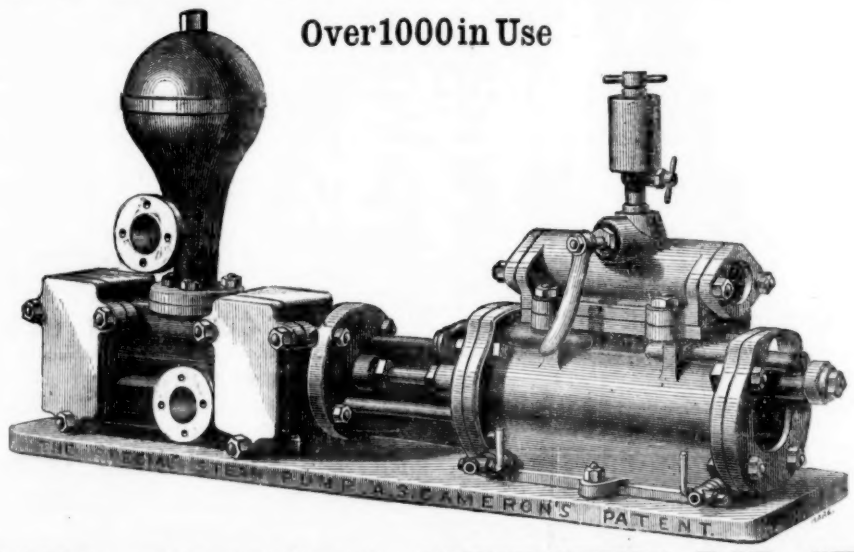


NOTE.

Requires NO Shafting, Gearing, Riggers, or Belts.

All Double-Acting.

Works at any Speed, and any Pressure of Steam.

Will Force to any Height.

Delivers a constant stream.

Can be placed any distance away from a Boiler.

Occupies little space.

Simple, Durable, Economical.

NO FLY-WHEEL, CRANK, GOVERNORS, CONNECTING ROD, GUIDE, OR ECCENTRIC.

Supplied to H.M.'s Arsenal and Dockyards at Woolwich, Chatham, and Devonport, also for use on board H.M.'s Ships, Hercules and Monarch.

FORTY THOUSAND GALLONS PER HOUR IS BEING RAISED 40 FEET HIGH AT MR. McMURRAY'S PAPER MILLS, WANDSWORTH, BY THE "SPECIAL" STEAM PUMP.

PRICES OF THE "SPECIAL" STEAM PUMPS.

Diameter of Steam Cylinder ....inches	2½	3	4	4	6	6	6	7	7	7	8	8	8	8	10	10	12	12	14	16	24
Diameter of Water Cylinder ....inches	1¼	1½	2	4	3	4	6	5	6	7	4	6	7	8	6	7	8	10	12	7	10
Length of Stroke ....inches	6	9	9	9	12	12	12	12	12	12	12	12	12	12	12	12	18	24	24	24	24
Strokes per minute	100	100	75	60	50	50	50	50	50	50	50	50	50	50	50	50	35	—	—	—	—
Gallons per hour	310	680	910	2900	1830	3250	7330	5070	7330	9750	3250	7330	9500	13,000	7330	9500	13,000	—	—	—	—
PRICE	£10	£15	£20	£30	£30	£40	£47 10	£50	£52 10	£57 10	£50	£55	£65	£75	£70	£80	£100	—	—	—	—

IF BRASS LINED, OR SOLID BRASS OR GUN-METAL WATER CYLINDERS, WITH COPPER AIR VESSELS, EXTRA, ACCORDING TO SIZE.

Any Combination can be made between the Steam and Water Cylinders, provided the Lengths of Stroke are the same, thus—8 in. Steam and 3 in. Water, or 10 in. Steam and 3 in. Water, adapted to height of lift and pressure of steam, and so on.

TANGYE BROTHERS & HOLMAN: Offices & Warehouse, 10, Laurence Pountney-lane, London, E.C.

GWYNNE AND CO., ENGINEERS,

ESSEX STREET WORKS, STRAND, LONDON, W.C.

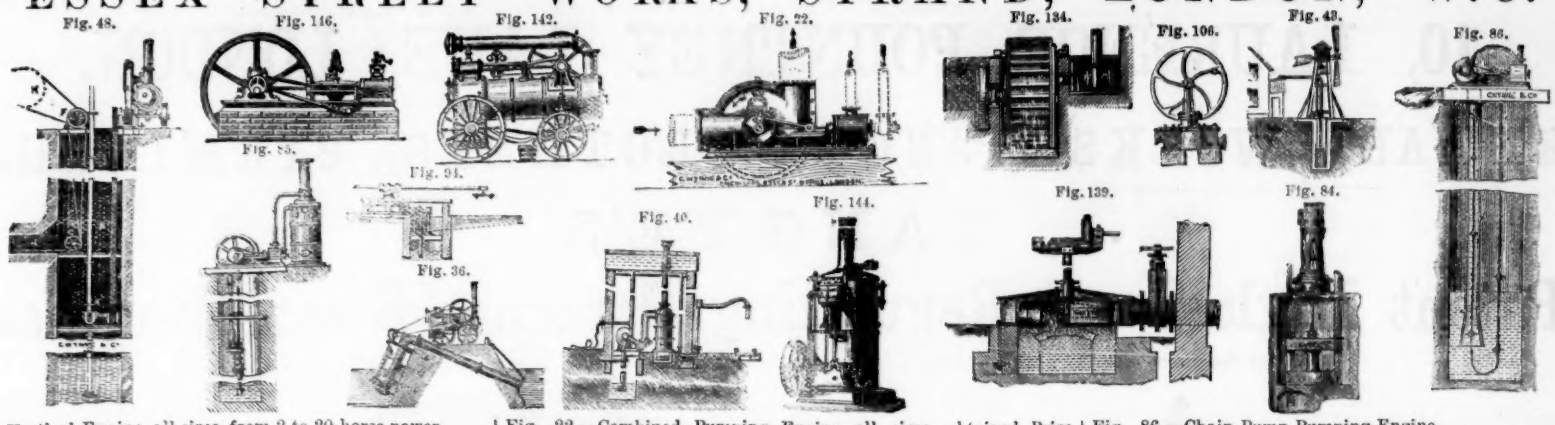


Fig. 144.—Vertical Engine, all sizes, from 2 to 20-horse power.
Fig. 146.—Horizontal Engine, from 4 to 100-horse power.
Fig. 142.—Portable Engine, from 2½ to 30-horse power.
Fig. 40.—Gwynne and Co.'s Combined Stationary Pumping Engine.
Fig. 139.—Turbine Water-wheel, from 1 to 300-horse power.
Fig. 22.—Combined Pumping Engine, all sizes, obtained Prize Medal, Paris Exhibition.
Fig. 85.—Deep Well Pumping Engine, all sizes.
Fig. 134.—Water-wheel Pumping Machinery.
Fig. 36.—Gwynne and Co.'s Patent Syphon Drainage Machinery.
Fig. 95.—Horse-power Pumping Machinery.
Fig. 86.—Chain Pump Pumping Engine.
Fig. 48.—Deep Mine Centrifugal Pumping Machinery.
Fig. 84.—Double-acting Vertical Pumping Engine.
Fig. 106.—Gwynne and Co.'s Improved Plunger Hand Pump.
Fig. 43.—Wind Power Pumping Machinery.

Steam Engines of all kinds and sizes, Hand and Steam Fire Engines, Water Wheels, Hydraulic Lifts, Cranes and Jacks, Steam and Water Valves, Hydraulic Presses, Sheep Washing Machinery, &c., &c.

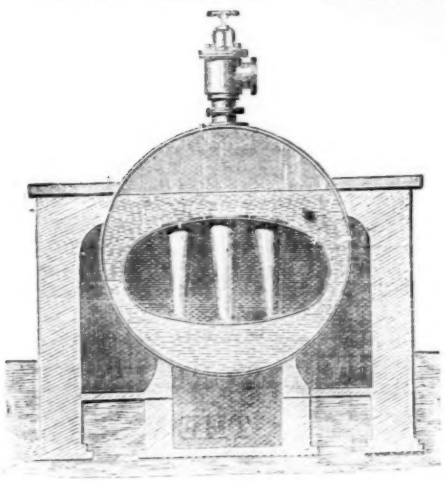
List of Centrifugal Pumps, two stamps. Illustrated Catalogues of Pumping Machinery, six stamps. Large Illustrated Catalogue, with many Estimates, &c., twelve stamps. All post free.
GWYNNE and Co. have recently effected a considerable reduction in their prices, being determined to supply not only *the best* but *the cheapest* Pumping Machinery in the world.

GWYNNE AND CO.,

HYDRAULIC AND MECHANICAL ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

GALLOWAY'S

PATENT CONICAL WATER TUBES FOR STEAM BOILERS.



Section of the "Galloway" Boiler, showing arrangement of back flues, the furnaces being of the same construction as in the common two-flued boiler.

The above TUBES are made with such an amount of taper as will allow the bottom flange to pass through the hole in the upper side of the boiler flue, which renders their introduction into ordinary fluid boilers a simple operation, and with the following advantages:—

The POWER of the BOILER is CONSIDERABLY INCREASED, and the FLUES ARE MATERIALLY STRENGTHENED.

The CIRCULATION of the WATER is MUCH IMPROVED, and UNEQUAL EXPANSION, with its attendant evils, PREVENTED.

LIABILITY TO PRIME IS LESSENED.

These Tubes have now been in use upwards of fourteen years, and above 50,000 are in work in various parts of the country with the best results.

They can be fixed by any boiler-maker, but can only be obtained from the Patentees.

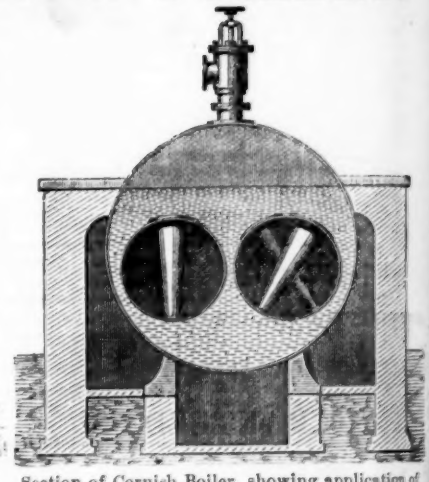
W. & J. GALLOWAY & SONS,

ENGINEERS AND BOILER MAKERS,

MANCHESTER,

Makers of Wrought-iron Parallel Tubes, 40s. p. cwt.

MANUFACTURERS OF THE WELL-KNOWN



Section of Cornish Boiler, showing application of the "Galloway" Tubes.

"GALLOWAY BOILER,"

AS PER SKETCH ANNEXED.

UPWARDS OF TWO THOUSAND OF WHICH ARE NOW AT WORK.

BOILERS OF ANY DIMENSIONS, UPON THIS OR ANY OTHER PLAN, CAN BE DELIVERED WITHIN A FEW DAYS FROM RECEIPT OF ORDER.

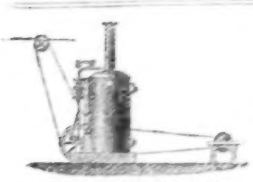
STEAM ENGINES OF EVERY DESCRIPTION.

General Millwrighting.—Hydraulic Machinery.—Polishing, Grinding, and other Machines for Plate Glass.

LEAD ROLLING MILLS AND PIPE PRESSES. CAST AND WROUGHT-IRON GIRDER BRIDGES.

HALEY AND OTHER LIFTING JACKS, BOILER RIVETS, &c.—SCREW BOLTS, STEEL PUNCHING BEARS.

Shearing and Punching Machines Bending Rolls, and every description of Boilermakers' Tools, &c., &c.



STATIONARY ENGINE.

CHAPLIN'S PATENT STEAM ENGINES & BOILERS

(PRIZE MEDAL, INTERNATIONAL EXHIBITION, 1862),

The ORIGINAL combined Vertical Engines and Boilers, introduced by Mr. CHAPLIN in 1855. Each class kept in Stock for Sale or Hire.

WIMSHURST & CO., ENGINEERS,

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ROBEY AND COMPANY, LIMITED,

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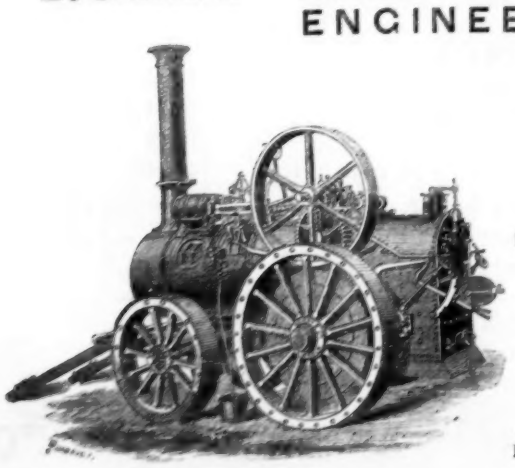

PATENT PORTABLE

HAULING AND WINDING ENGINE,

WITH

PATENT DRUM WINDLASSES,

FOR MINING PURPOSES.

This Engine is specially commended to Mining Engineers and others, as by its adoption—

Haulage along inclined drifts is easily and cheaply effected.

The expense of sinking new shafts is greatly reduced, neither foundations nor engine-house being required.

It is available not only for winding, but for pumping, sawing, &c.—a great desideratum at a large colliery.

It can be very quickly removed (being self-propelling), and fixed in any desired position.

Prices and full particulars on application as above, and also references to view the Engine in successful work near Derby, Carnarvon, Haverfordwest, Darlington, and other places.

HEPBURNS' PUMP LEATHER WATERPROOF

By a special method of preparation, this leather is made solid, perfectly close in texture, and impermeable to water; it has, therefore, all the qualifications essential for pump buckets, and is the most durable material of which they can be made. It may be had of all dealers in leather, and of

I. AND T. HEPBURN AND SONS,

CURRIERS AND CURRIERS, LEATHER MILLBAND AND HOSE PIPE MANUFACTURERS,

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